TAXONOMY OF SUBGENUS *BLADHIA* OF *ARDISIA* (MYRSINACEAE)[1]

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Abstract: Twenty-four species of subgenus *Bladhia* (Thunb.) Mez and two species of subgenus *Chinensia* (Nakai) Yang of *Ardisia* (Myrsinaceae) are recognized in this treatment. Subgenus *Bladhia* is redefined as the shrubby or subshrubby plants having axillary inflorescences from hypsophylls only or from both leaves and hypsophylls, 4-15 ovules in 1-3 series (mostly 4-6 ovules in one series) on the free central placenta, serrate or serrulate or fimbriate-serrulate leaves subverticillately arranged, hypsophylls on stems, and uniseriate and/or round-capitate and/or elongate-bicellular-capitate hairs on young stems, leaves, and inflorescences. On account of the position of inflorescences, this subgenus is possibly related to subgenus *Tinus* of *Ardisia*. However, the question concerning its allied subgenus is still open.

Subgenus *Chinensia* consisting of 2 species is delimited by having axillary inflorescences only from the leaves, 5-8 ovules in 1-2 series, leaves alternately arranged, coarsely dentate or undulate or entire, no hypsophylls, scales irregularly peltate on young stems, etc. Subgenus *Akosmos* is closely related to subgenus *Chinensia* as is evidenced by the similarity in inflorescences, calyx-lobes, series of ovules, leaf venation, and trichomes.

Geographically, subgenus *Bladhia* extends from Assam, northeast of India, to the Malay Peninsula, Java, Borneo, Indochina, the Philippines, South and East Mainland China, Taiwan, the Ryukyus, Japan, and Korea. Subgenus *Chinensia* is sporadically distributed in the Malay Peninsula, Indochina, and mostly distributed in South and East Mainland China, Taiwan, and the Ryukyus.

This study gives a taxonomic history of the subgenus concerned and a systematic treatment of vegetative and reproductive structures as well as foliar venation.

INTRODUCTION

Bladhia is a subgenus of *Ardisia* which is the largest genus of the family Myrsinaceae. The family was first revised by Mez in Volume 31 of Pflanzenreich edited by Engler in 1902. He divided the genus into 14 subgenera. Subgenus *Bladhia*, established therein, comprised a group of species mainly delimited by their short filaments, a few ovules in one series (mostly), herbaceous or suffrutescent and low creeping habit, serrulate or rarely entire leaves, small axillary

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umbellate or corymbose or paniculate inflorescences. Nine species and one variety were included, namely *A. odontophylla* Wall. *ex* A. DC, *A. odontophylla* Wall. var. *maingayi* Clarke, *A. metallica* N. E. Brown, *A. japonica* (Hornstedt) Blume, *A. chinensis* Benth., *A. faberi* Hemsl., *A. verbascifolia* Mez, *A. mamillata* Hance, *A. primulifolia* Gardn. & Champ., and *A. villosa* (Thunb.) Mez (=*A. pusilla* A. DC.). Geographically, they are distributed from Assam through Indochina to Japan. More than forty specific names have been validly published. The additions to the subgenus after Mez (1902) represent the contributions of many authors (King and Gamble, 1905; Ridley, 1923; Pitard, 1930; Merrill, 1932; Fletcher, 1937; Walker, 1940; Nakai, 1943; Furtado, 1958; etc.). Most of these additions were found in the area from Peninsula Malaya to the southern part of Yunnan, and Hainan, China. Working on the *Ardisia* species of Indochina, Pitard (1930) changed all the subgeneric ranks into sections and attributed them to Mez without any explanation, at the same time challenging the inclusion of *A. primulifolia*, *A. mamillata*, *A. verbascifolia*, and A. *chinensis* in the section *Bladhia*. He then placed the four in another section *Crispardisia*, using as the key character, the albuminous marginal glands on the leaves. In 1940, after revising the Asiatic *Ardisia* species, Walker independently included the former two species in *Crispardisia*, but retained *A. chinensis* in *Bladhia*. *A. verbascifolia* was not treated in his paper since it did not occur in the areas under investigation. Nakai (1943) systematically studied the species of Myrsinaceae found in Japan (including Taiwan, the Ryukyus, and Korea). He separated *A. chinensis* from section *Eubladhia*, establishing a new section *Chinensis* to accomodate it. In 1979, Chen, following Walker, relocated *A. chinensis* in *Bladhia* for the treatment of Myrsinaceae of Mainland China.

These several changes concerning the components in *Bladhia* suggested that the subgenus as originally constituted was an unnatural array of species. On the other hand, a few species were erroneously placed in *Bladhia* in the past decades. For example, emphasizing a single character, i. e. undulate-dentate leaves, Fletcher in 1937 regarded *A. undulato-dentata* as a related species of *A. japonica*. Fang and Yao (1979) regarded *A. violacea* as a member of *Bladhia* stressing its herbaceous habit, nearly rosulate leaves, slender and few-flowered inflorescences. In fact, the two species do not belong to subgenus *Bladhia* based on such few characters. When the four species mentioned above are excluded, the remainder of Mez's *Bladhia* can be readily sorted into three groups by their vestiture, calyx shape, leaf venation pattern, and pollen morphology. This infrasubgeneric heterogeneity in light of the paucity of specimens and species in Mez's time was not appreciated. However, this became evident with extensive collections in later years.

Ardisia is not only an intricate genus but a large one. Mez (1902) treated 235 species, and the total must be well over 300 by now (Stone, 1982). Nine of the fourteen subgenera ranked by Mez range from Continental Asia, Malesia, Australia, to the Pacific Islands; the other five are limited to the Americas (Stone, 1982). Lundell (1981) in studying neotropical *Ardisia* reinstated and realigned several genera, e.g. *Icacorea*, *Auriculardisia*, *Graphardisia*, *Ibarraea*, and so forth. In his treatment, some species or even genera had already been accepted as the members of *Ardisia* by Mez. Thus, Lundell's interpretation of genus *Ardisia* is obviously a narrow one. It suggests that a fresh treatment of the family or at least the genera in the Paleotropics is necessary. Furthermore, the eighty-five-year old treatment by Mez seems incompatible considering the growing body of species and the great number of current collections. Actually,

in *Ardisia*, a few species, which do not conform precisely to the diagnostic features of the subgenera, confirm this disharmony (Stone, 1982). A systematic treatment of any subgenus of *Ardisia* is necessary for the understanding of *Ardisia* as a whole; hopefully this revision will represent a foundation stone for this complex genus in Asia.

HISTORY OF SUBGENUS BLADHIA

In 1920, when the number of species of Myrsinaceae was increasing by leaps and bounds, Mez monographed the family. He established 14 subgenera for genus *Ardisia*. Re-evaluating Thunberg's *Bladhia* (1781) and reducing it to subgenus *Bladhia* Mez, he characterized the subgenus by the following combination of characters—herbaceous or subshrubby plants, short or very short filaments, 5-10 ovules in an ovary, serrate or entire leaves, axillary umbellate or corymbose or paniculate inflorescences, styles shorter than petals in length. Included in subgenus *Bladhia* Mez are *A. odontophylla* Wall. *ex* A. DC., *A. odontophylla* A. DC. var. *maingayi* Clarke, *A. metallica* N. E. Brown, *A. japonica* (Thunb.) Blume, *A. chinensis* Benth., *A. villosa* (Thunb.) Mez. (=*A. pusilla* A. DC.), *A. faberi* Hemsley, *A. verbascifolia* Mez, *A. mamillata* Hance, and *A. primulifolia* Gardn. & Champ. Although Mez did not designate the type species for the subgenus, *A. japonica*, the type species of Thunberg's *Bladhia*, is a likely candidate. Afterwards, some *Ardisia* species were added to this subgenus, e. g. *A. bambusetorum* King & Gamble (1906), *A. theaefolia* King & Gamble (1906), *A. gigantifolia* Stapf (1906), *A. kteniophylla* A. DC. (1910), *A. reptans* Merrill (1910), *A. cavalerei* Level. (1912), and *A. maclurei* Merrill (1922). However, before 1930, all Asiatic species of *Ardisia*, described as now, were treated according to Mez's classification. Pitard (1930) and Walker (1940) made substantial contributions to this subgenus. Nakai (1943) also treated the subgenus, but little attention was paid to his work because he treated only Japanese species (also including those of the Ryukyus and Taiwan) (Walker, 1954).

In his revision of Indochina's Myrsinaceae, Pitard (1930) presented a key to seven sections of *Ardisia*. He described all known species for each section. Since he attributed these sections to Mez, one assumes that Pitard's sections are more or less equivalent to Mez's subgenera.

Notably, Mez's subgenus *Bladhia* was not recognized in Pitard's treatment, although a few members of Mez's subgenus *Bladhia* were included. The reason was that Pitard, stressing one character, leaves with marginal glands (the key character of Mez's subgenus *Crispardisia*), excluded the following: *A. chinensis*, *A. primulifolia*, *A. mamillata*, and *A. verbascifolia*, placing them in the section *Crispardisia*. Additionally, he also rejected *A. kteniophylla* (=*A. gigantifolia*), an allied species of *A. odontophylla*, placing it in section *Akosmos*, on the basis of having recurved calyx-lobes after anthesis and lateral inflorescences on branch.

Ten years later, in a revision of Eastern Asiatic Myrsinaceae, Walker (1940), giving no explanation, changed Mez's subgenera into sections. In 1954, he excluded *A. primulifolia* and *A. mamillata* from the section *Bladhia*. In the meantime, he restored *A. gigantifolia* and *A. chinensis* to their original position, section *Bladhia*. Both Pitard's and Walker's excellent works tend to support the view that this subgenus is more or less homogeneous.

Realizing the differences in leaf phyllotaxy, inflorescence position, and trichome type, Nakai (1943) established a new section *Chinensis* to accommodate the incom-

patibility between *A. chinensis* and other components of subgenus *Bladhia*. In spite of accepting this new alignment, Walker (1959) still retained *A. chinensis* in section *Bladhia* when he reviewed Formosan Myrsinaceae. The same treatment was also made by Chen (1979) in his revision of the Myrsinaceae of China. Besides section *Chinensis*, Nakai established a section *Eubladhia* for those true members of Mez's subgenus *Bladhia*. The name is apparently not acceptable according to the International Code.

In 1982, Stone restored Mez's subgeneric rank in his revision of Malaysian Myrsinaceae. In my revision, I follow Stone's determination, not only because previous authors established illegitimate sections as well as attributed those sections to Mez which are not acceptable, but also because the subgenus level as conceived by Stone can accommodate a complex infrasubgeneric system.

ECOLOGY AND MORPHOLOGY

Ecology

Most species of subgenus *Bladhia* are recorded as growing either in dense forests or in moist habitats near streams or ravines. Only one species, *A. botryosa* was noted as being collected at an open site (Walker, 1942).

Many species grow in tropical or subtropical broad-leaved forests; a few species grow in temperate broad-leaved or coniferous forests.

Generally, the species of subgenus *Bladhia* are distributed from 0 to 2200 meters in elevation. Specimens of *A. maingayi* (Clarke) King & Gamble gathered at 0 to 300 meters in the Malay Peninsula are known to have the lowest elevation among all investigated species. The species collected at the highest elevation is possibly *A. faberi* Hemsl., growing up to 2200 meters (Chen, 1979).

Habit

Most species of subgenus *Bladhia* are woody while *A. pusilla* and *A. maclurei* are both dwarf and subprostrate, and are presumably only slightly woody. Many species have either long or short creeping rhizomes for propagation.

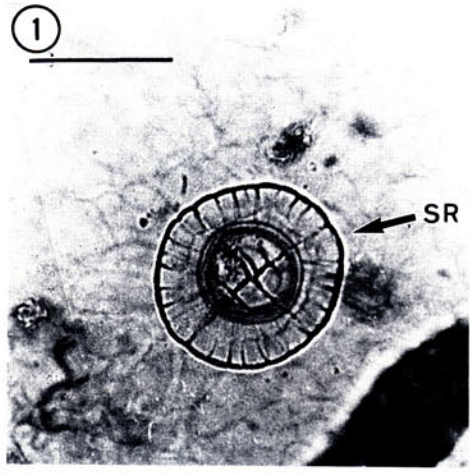
Usually, the plants of subgenus *Bladhia* are not more than 1 meter in height. *A. silvestris* Pitard and *A. gigantifolia* may attain a height of up to three meters (Chen, 1979).

Most species of the subgenus bloom from May to August, and fruit until December.

Trichomes

Trichomes vary in the species of subgenus *Bladhia*. The most common trichome is a round peltate scale (Fig. 1).

Uniseriate hairs are found in *A. japonica*, *A. pusilla*, *A. maclurei*, *A. walkerii*, and *A. faberi*. The hairs are either long and large (Fig. 9), or short and small (Fig. 8). The latter type, scarcely visible to the naked eye, is confined to *A. japonica* appearing only on young stems, young leaves, and inflorescences. Long and large uniseriate hairs are easily observed on the leaves, stems, and inflorescences of *A. pusilla*, *A. faberi*, *A. maclurei*, and *A. walkerii*. In addition, such hairs may be found in some species of other subgenera of *Ardisia*, such as *Crispardisia* and *Akosmos* (Stone, 1983). These two types of hairs are similar superficially, but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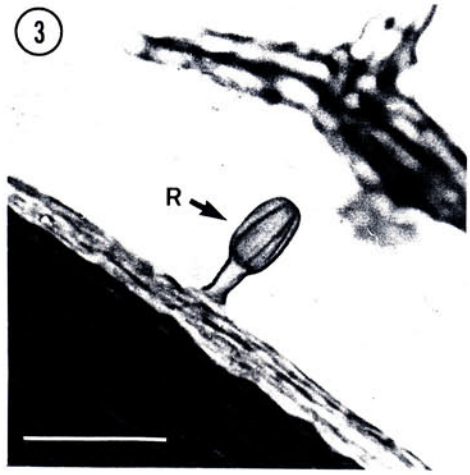
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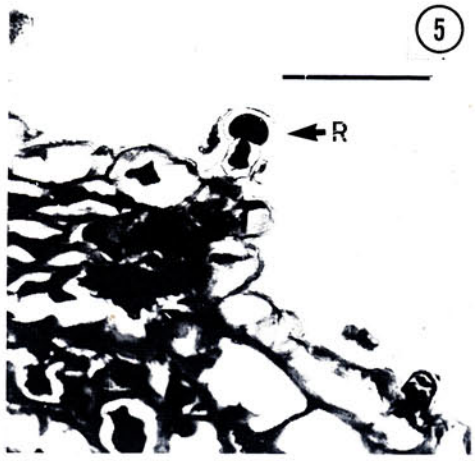
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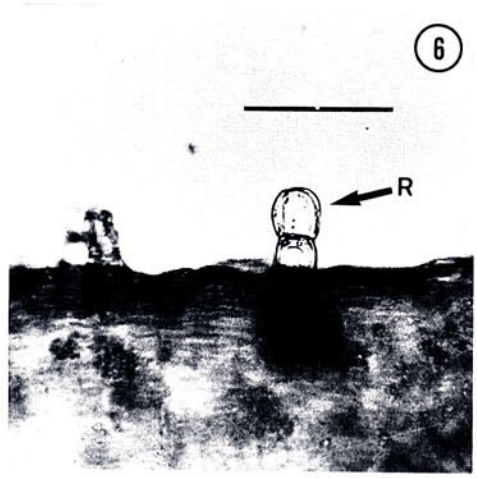
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two apical cells with thickened cell walls at the adjacent (Fig. 8) characterize the former while a small apical cell the latter (Fig. 9). The hairs are useful characters for the classification of this subgenus.

Capitate trichomes are visible in the majority of the species of subgenus *Bladhia* except *A. chinensis* and *A. argenticaulis* which are excluded from this subgenus in latter treatment. Two types of capitate trichomes are recognized; one has a short 1-2-celled stalk and a round-capitate head consisting of 2-4 cells (Figs. 3-7), the other a shorter 1-celled stalk and a 2-celled elongate-capitate head with pointed apex (Figs. 10-12).

Depending on their position on the plants, the trichomes are quite variable in density, size, and even type. Usually, the trichomes occuring on the inflorescences are shorter or smaller than those on the leaves and stems. In addition, the adaxial surface of the leaves is usually much less pubescent than the abaxial surface. Besides, few species show trichome dimorphism on both surfaces. The adaxial surface of the leaves has the trichomes sparsely scattered; these are emarginate and biseriate. These were described as irregular capitate trichomes by Lersten in 1977. The abaxial surface of the leaves has dense irrgular peltate and round peltate scales. This dimorphism was also recorded by Lersten in 1977 as occurring in subgenera *Akosmos*, *Icacorea*, *Tinus*, etc. With respect to other species of subgenus *Bladhia*, no evidence supports such dimorphism.

Crystals

In 1977, Lersten first reported the observation of prismatic crystals and druses in the genus *Ardisia*. However, these two types of crystal are found in all species of subgenus *Bladhia*, and both may be observed in an individual plant. The druses are always located within the vacuoles of the cells of tissues, being found in leaves, stems, and reproductive organs (Figs. 17 & 18). The prismatic type may be observed in the cells or on the cells of the sheath of leaf veins.

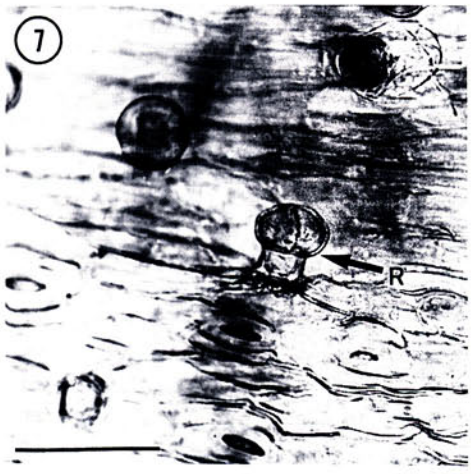
Leaves and hypsophylls

The leaves of *Bladhia* are usually subopposite or subverticillate or rarely alternate on stems, and are simple, serrate or serrulate or fimbriate-serrulate. Four species, *A. chinensis*, *A. argenticaulis*, *A. theaefolia* and *A. metallica* have alternate leaves, but the last occasionally has subopposite or subverticillate leaves. In the species *A. chinensis* and *A. argenticaulis*, the leaves are coarse-serrulate and/or undulate and/or entire in a single population; in all the remaining species of this section, leaves are serrate, serrulate, or fimbriate-serrulate.

In the subgenus, the texture of leaves is mostly chartaceous except subcoriaceous in *A. japonica* and membranous in *A. curvistyla*. Therefore, the character is rather homogeneous in the subgenus.

Winged petioles of leaves are found in some species, such as *A. silvestris*, *A.*

Fig. 1. Round-peltate scale of *Ardisia pusilla*. (*Furuse 1179*). Bar=68 μm.
Fig. 2. Irregular-peltate scale of *Ardisia chinensis*. (*Lu s. n.* May, 1985). Bar=54 μm.
Fig. 3. Round-capitate hair of *Ardisia faberi*. (*Henry 98*). Bar=68 μm.
Fig. 4. Round-capitate hair of *Ardisia japonica*. (*Lu s. n.* Dec. 12, 1985). Bar=82 μm.
Fig. 5. Round-capitate hair of *Ardisia cameronensis*. (*van Steenis 18538*). Bar=42 μm.
Fig. 6. Round-capitate hair of *Ardisia gigantifolia*. (*Tsang 9012*). Bar=54 μm.
Note: R=Round-capitate hairs. SR=Round-peltate scales. SI=Irregular-peltate scales.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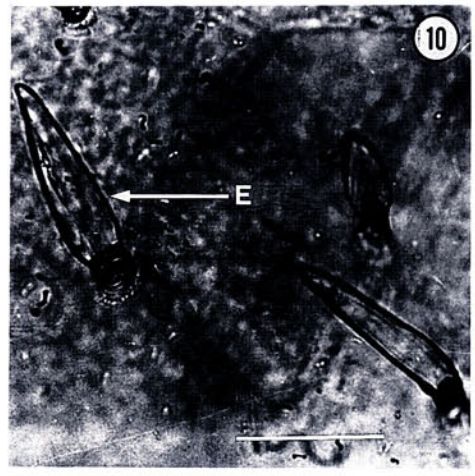
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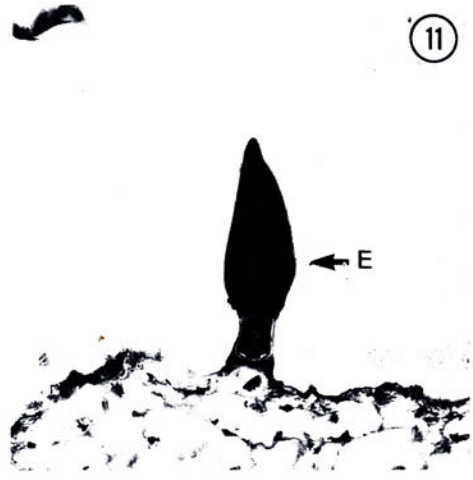
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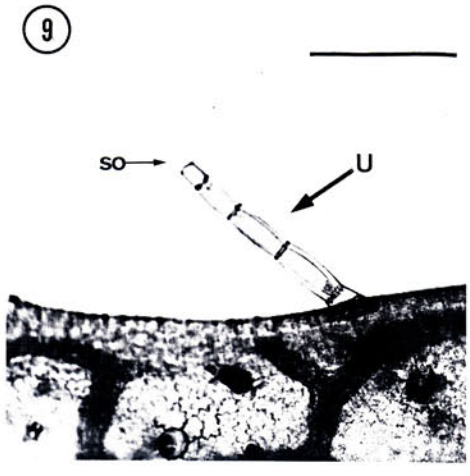
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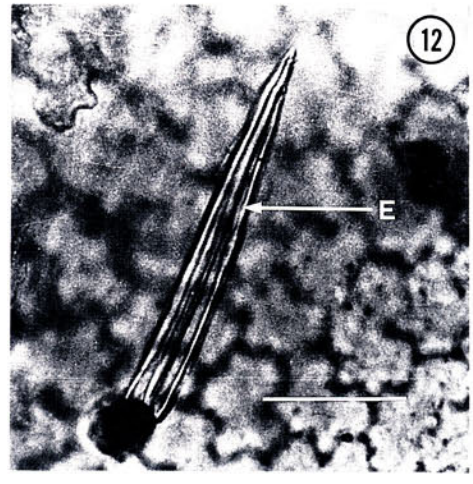
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botryosa, etc. It is worth pointing out that the petioles of *A. ramondiaeformis* Pitard are not winged in the juvenile stage but conspicuously winged at maturity. This fact suggests that the winged petioles were derived from the unwinged.

The stomata are confined to the abaxial surface of leaves and the inflorescence. Based on Dilcher's review (1974), the stomatal type is anisocytic with three subsidiary cells around the guard cells; among these three cells, one is smaller than the other two (Figs. 13 & 14). This stomatal type agrees with the description of the family Myrsinaceae made by Cronquist (1981).

Two anticlinal cell-wall patterns of epidermal cells of leaves were observed in the *Bladhia*. Based on Dilcher's classification (1974), the pattern in *A. chinensis* and *A. argenticaulis* is straight (Fig. 13), and that in the others undulate (Figs. 15 & 16).

According to MClean and Ivimey-Cook (1960), hypsophylls, small leaf-like structures inserted on the stems, are present in most species of subgenus *Bladhia*. Their shape are mostly lanceolate or oblanceolate or linear. A cordate shape with caudate apex is found in *A. silvestris*. Trichomes and punctate dots are also found on the hypsophylls. In *A. chinensis* and *A. argenticaulis*, no hypsophylls were found.

Punctation

Punctate dots scattered on leaves, fruit, and flowers are characteristic of the family Myrsinaceae including its largest genus *Ardisia*. Punctate dots are usually visible near the leaf margin of the specimens of many species, particularly the specimens of *A. odontophylla*, *A. balansana* and *A. botryosa*. These visible dots, always elevated on the epidermis and orange in color, are not important interspecifically.

In addition, some punctate dots, invisible on the surface of the leaves, form various patterns hidden in the leaves of species of subgenus *Bladhia*. The dots become evident under transillumination. The sites of the dots are for the most part slightly elevated sublente.

Invisible dots are diverse as to color, size, density, and shape. Their colors are usually orange, rarely blackish (*A. curvistyla*), and translucent or light yellow (*A. maingayi*). The range is from dense to sparse. The shape is round or rod-like or thread-like.

The invisible punctate patterns are various at the specific level. For instance, *A. silvestris* has very dense orange dots within leaves under transillumination, while *A. gigantifolia* has sparse orange ones. It is noted that the punctate pattern is invariable at the specific level in all investigated species. In a group of collections, superficially appearing to represent one species, the presence of only orange

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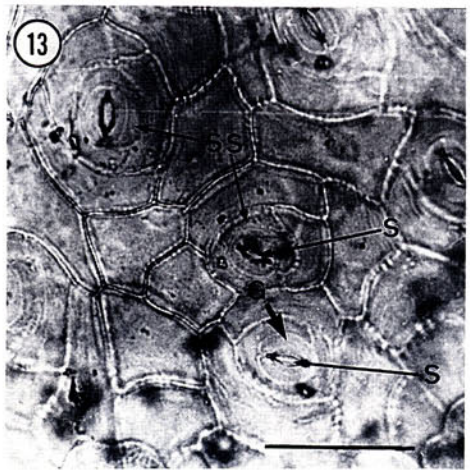
Fig. 7. Round-capitate hair of *Ardisia theaefolia*. (*Maxwell 78172*). Bar=82 μm.
Fig. 8. Uniseriate hair of *Ardisia japonica*. (*Lu s. n.* Dec. 12, 1985). Bar=360 μm.
Fig. 9. Uniseriate hair of *Ardisia walkerii*. (Colected at Yabu-koji in Aug., 1910). Bar=500 μm.
Fig. 10. Elongate-bicellular-capitate hair of *Ardisia metallica*. (*Bakh v/d Brink 9398*). Bar=134 μm.
Fig. 11. Elongate-bicellular-capitate hair of *Ardisia maingayi*. (*Lobb 316*). (Bar=100 μm).
Fig. 12. Elongate-bicellular-capitate hair of *Ardisia replicata*. (*Liang 69643*). Bar=134 μm.

Note: E=Elongate-bicellular-capitate hairs. SO=Uniseriate hairs with two apical cells.
R=Round-capitate-hairs. U=Uniseriate hairs.
S=Thickened cell wall. US=Uniseriate hairs with one apical cells.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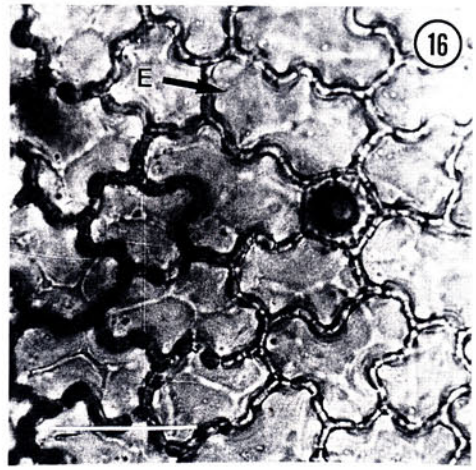
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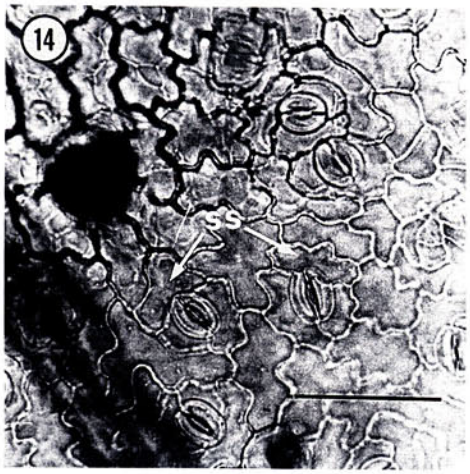
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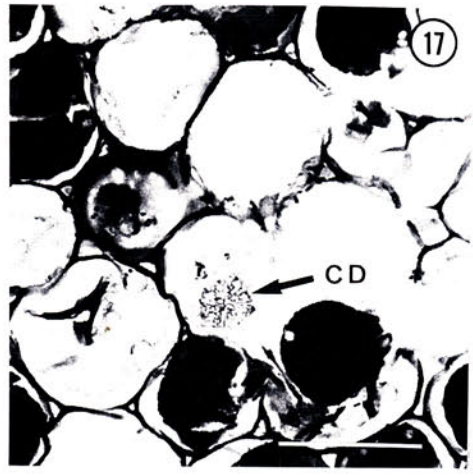
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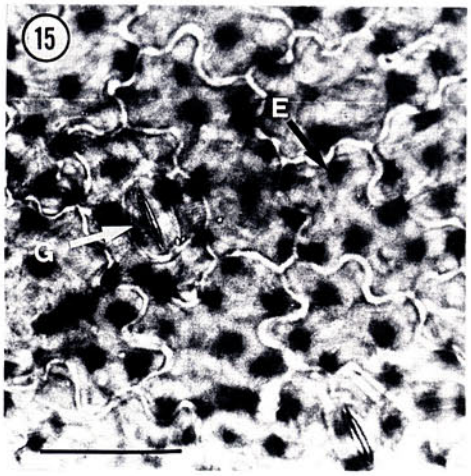
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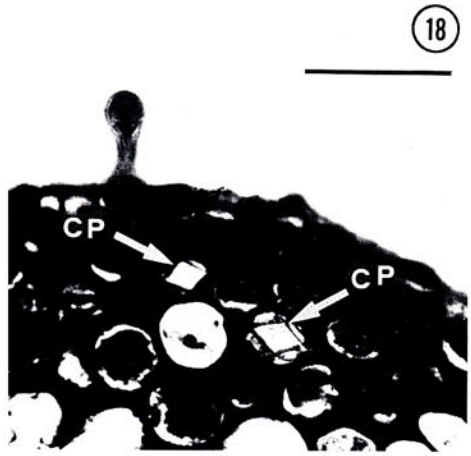
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dots in some, the appearance of black dots in others suggest that in reality two species are involved.

Venation

Three types of venation in the species investigated are recognized. The first venation type, "brochidodromous" type (Hickey, 1974), is found in *A. chinensis*, *A. argenticaulis*, *A. odontophylla*, *A. metallica*, *A. maingayi*, etc. An intramarginal vein is additionally formed at leaf margins in *A. chinensis* and *A. argenticaulis* (Fig. 19, 22). The second type has the secondary veins branching just within the margin, one of the branches terminating at the margin, the other joining the superadjacent secondary. However, very few secondaries appear "reticulodromous"; these secondaries lose their identity toward the leaf margin by repeated branching into a vein reticulum. This type is here referred as "semicraspedodromous", differing little from Hickey's definition (1974). It is found in *A. japonica* (Fig. 20). The third type has the secondary veins mostly terminating at the margin and less number of secondaries otherwise (Fig. 21). This type of venation is here named "mixed craspedodromous" although it does not exactly agree with Hickey's definition (1974). This is observed in *A. pusilla*, *A. walkerii*, *A. faberi*, and *A. maclurei*.

Inflorescences

The inflorescences of subgenus *Bladhia* are axillary from both hypsophylls and leaves, or from leaves only (*A. chinensis* and *A. argenticaulis*). Inflorescences are racemose or subumbellate or subumbellate-paniculate or paniculate (Figs. 23–26). Most species exhibit considerable variation in the inflorescence. The variety of types which may occur in a single species may range (1) from subumbellate to subumbellate-paniculate, (2) from racemose to subumbellate-paniculate, and (3) from subumbellate-paniculate to open paniculate. For example, *A. japonica* usually has subumbellate inflorescences, but occasionally has subumbellate-paniculate inflorescences.

In general, those species which are less than 50 cm in height usually produce subumbellate inflorescences, e. g. *A. japonica*, *A. pusilla*, *A. maclurei*, *A. metallica*, *A. chinensis*, and *A. walkerii*.

Generally, the paniculate inflorescences have much more flowers than the subumbellate ones. A single subumbellate inflorescence usually has not more than eight flowers.

The flowers of this subgenus are without nectars and are odorless.

Fig. 13. Stomata, guard cells, and subsidiary cells of *Ardisia chinensis*. (*Lu s. n.* May, 1985). Bar=54 μm.

Fig. 14. Stomata, guard cells, and subsidiary cells of *Ardisia cameronensis*. (*Lu s. n.* May, 1985). Bar=54 μm.

Fig. 15. Epidermal cells of the abaxial surface of the leaves of *Ardisia fimbriata*. (*Kerr 10374*). Bar=54 μm.

Fig. 16. Epidermal cells of the abaxial surface of the leaves of *Ardisia replicata*. (*Liang 69643*). Bar=54 μm.

Fig. 17. Druse of *Ardisia chinensis*. (*Lu s. n.* May, 1985). Bar=68 μm.

Fig. 18. Prismatic crystal of *Ardisia japonica*. (*Lu s. n.* May, 1985). Bar=1.4 mm.

Note: CD=Druse. E=Epidermal cells. S=Stomata.
CP=Crystal prismatic. G=Guard cells. SS=Subsidiary cells.

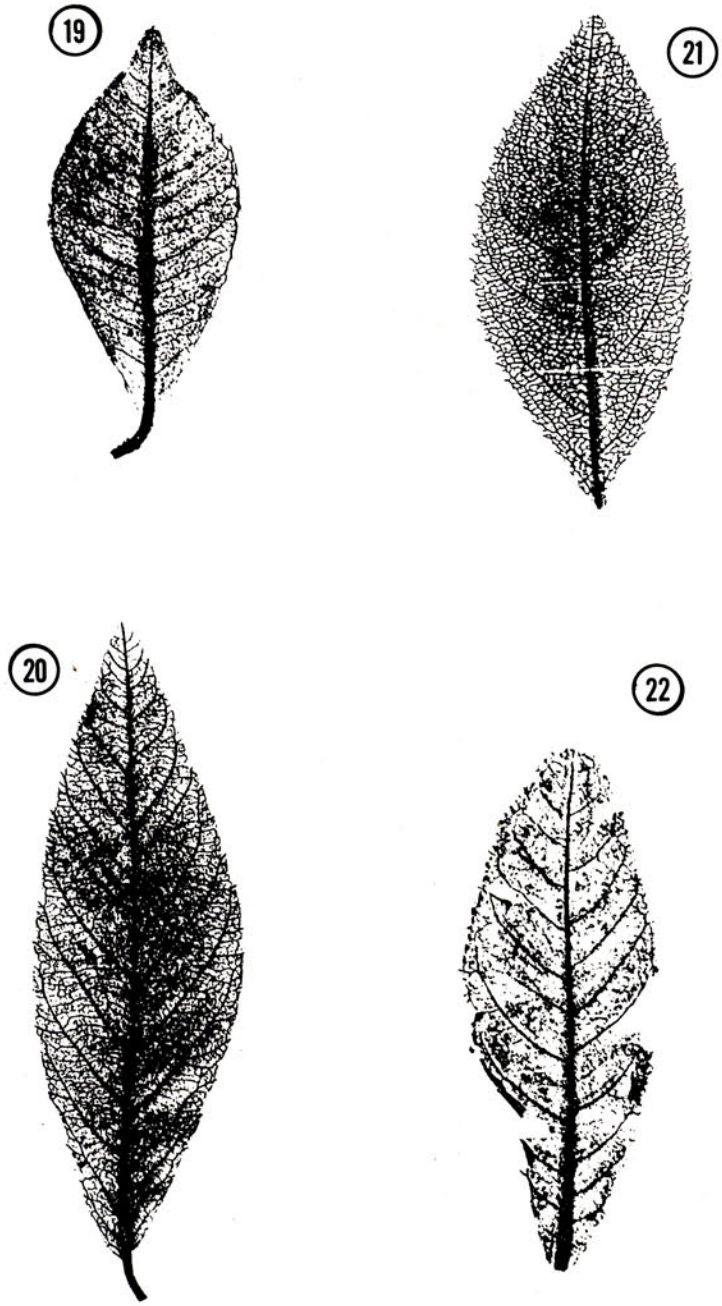

Fig. 19. Leaf venation of *Ardisia chinensis.* (*Lau 4070*).
Fig. 20. Leaf venation of *Ardisia japonica.* (*Teng 90569*).
Fig. 21. Leaf venation of *Ardisia faberi.* (*Wilson 7816*).
Fig. 22. Leaf venation of *Ardisia maingayi.* (*King's Collector 7367*).

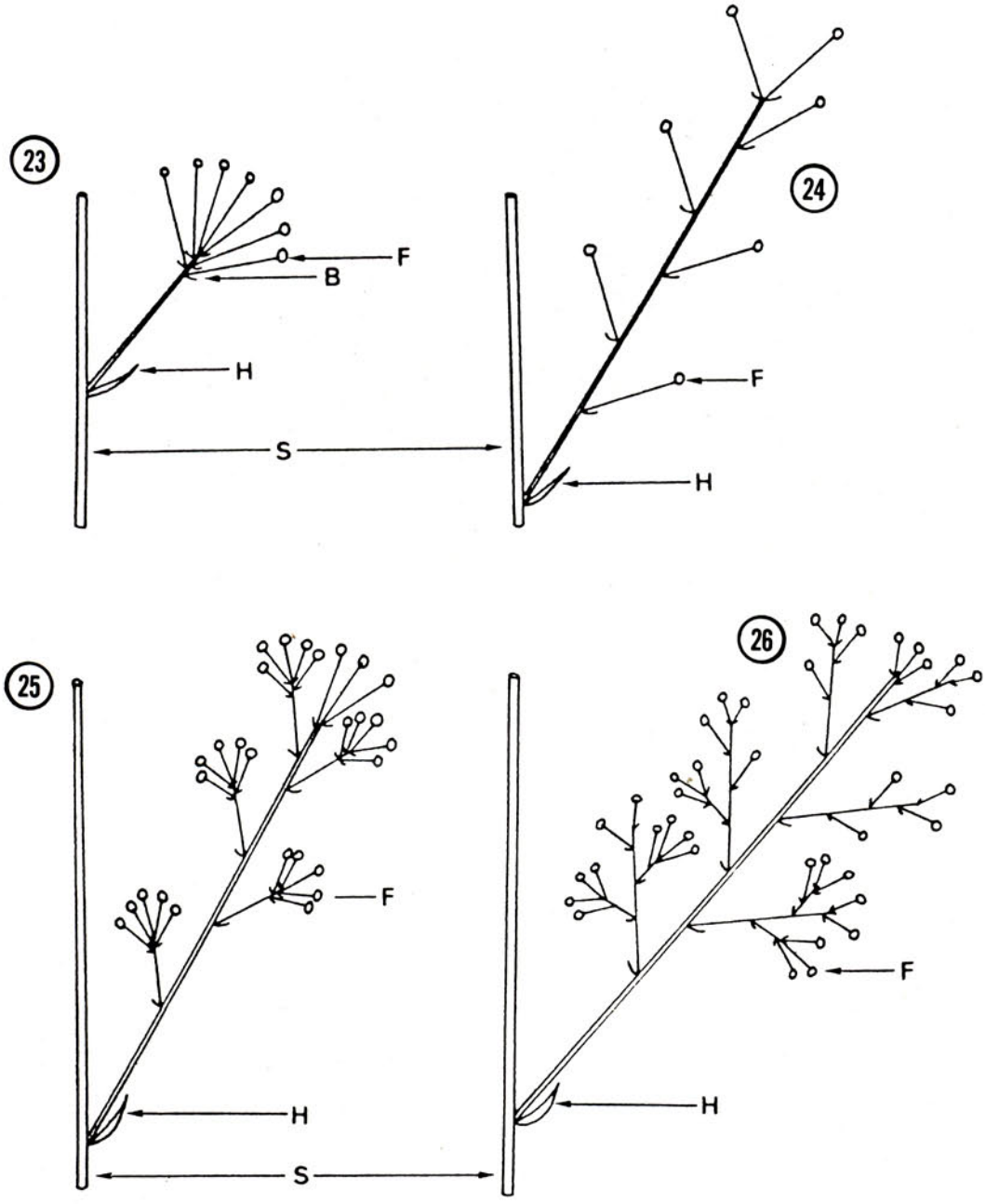

Fig. 23. Subumbellate inflorescence.
Fig. 24. Racemose inflorescence.
Fig. 25. Racemose-paniculate inflorescence.
Fig. 26. Paniculate inflorescence.

Note: B=Bract. F=Flower. H=Hypsophyll. S=Stem.

Calyx

The calyx of the subgenus is composed of five lobes either shallowly or partly connate at the base. The lobes or segments may be open, i. e. there is no contact between adjacent lobes in the bud or only slightly so, being scarcely imbricate in bud. Open lobes occur in the following species: *A. chinensis*, *A. argenticaulis*, *A. pusilla*, *A. maclurei*, *A. faberi*, and *A. walkerii*. The outline of these lobes is triangular or elongate-triangular or elongate-lanceolate. Two species, *A. chienesis* and *A. argenticaulis*, have triangular calycine lobes, which basically characterize the subgenus *Chinensia* (discussed in the following chapter).

In subgenus *Bladhia*, *A. pusilla* has long lanceolate lobes while *A. maclurei*, *A. faberi* and *A. walkerii* have long triangular lobes with an apiculum. All other members possess ovate or somewhat ovate lobes which are slightly imbricate.

Usually, calyx lobes are punctate with orange or blackish dots at the abaxial surface and with minute cilia at the margin. Whether the punctate dots are dense or sparse, or occur or do not occur along the midvein of the lobe, varies interspecifically.

The calyx lobes become slightly reflexed during the ripening of the fruit. The texture of the lobes of the species investigated is chartaceous except *A. argenticaulis* which has subchartaceous (nearly membranous) lobes.

Corolla

As is characteristic of the genus *Ardisia*, the corolla of the subgenus is gamopetalous, actinomorphic, and typically five-lobed. The lobes are shortly united at the base and imbricate in floral buds. Corolla lobes become more or less reflexed in anthesis.

The inside of the corolla is glabrous in almost all the species, except *A. japonica* which is pubescent within near the base. Corolla lobes are usually ovate, acuminate, acute or slightly obtuse at the apex.

Corolla lobes may be white, pink or rose. The color or absence of color may vary intraspecifically as is readily ascertained from field notes. Punctate dotes are present in the corolla of nearly all species, these varying from red to pink.

Androecium

As in all other subgenera of *Ardisia*, stamens of the *Bladhia* are five, opposite the corolla lobes and adnate to the base of the corolla. Due to the fusion of the bases of corolla and filaments, a thickened ring always appears at the base of the corolla tube.

The filaments are very short and less than half the length of the anthers, a characteristic shared by most *Ardisia* species in Asia. According to Mez (1902), filament length provides a useful character for distinguishing the neotropical subgenera from the paleotropical ones.

Anthers are basifixed and dehiscent longitudinally. In outline the anther is ovate or triangular-ovate. The apex of the anthers is acute or obtuse or minutely apiculate or rarely emarginate (*A. curvistyla*), and the back is mostly punctate. These characters are helpful in distinguishing some species.

Gynoecium

The pistil of the subgenus, like *Ardisia* species in other subgenera, is charac-

terized by a subglobose superior ovary and a style with a stigma. The stigma is usually capitate due to the swollened cells at the apex of the style. Sometimes, the stigma is acute, a circumstance possibly related to the stage of anthesis. The style is more or less straight, except curved in *A. curvistyla* and occasionally in *A. gigantifolia*.

In more than half of the species in subgenus *Bladhia*, the ovaries are pubescent with the trichomes similar to those on vegetative parts, but considerably shorter. Two exceptions are *A. bambusetorum* and *A. cameronensis* whose ovaries are glabrous while their vegetative parts are pubescent with elongate-capitate trichomes. Occasionally, the ovary of *A. cameronensis* is slightly pubescent.

The ovaries of subgenus *Bladhia* are for the most part uniformly one-celled, and the placentation is free central. The globular or sometimes compressed-globular placenta has four to 15 ovules mostly arranged in one series. *A. japonica* and *A. argenticaulis*, however, have more than one series of ovules. The former possesses two or three series, the latter one or two. In considering the variation of one or two series of ovules in *A. argenticaulis*, it may be postulated that the monoseriate pattern has evolved from one in which the ovules and disposed in two or more series. This suggests that subgenus *Bladhia* is an advanced group in the genus *Ardisia* since many subgenera are characterized by several series of ovules, e. g. *Akosmos*, *Stylardisia*, *Pimelandra*, *Acrardisia*, etc.

Fruits and seeds

The indehiscent fleshy drupe-like fruits of this subgenus are always globose with one globular seed. Sometimes, the trichomes persist to the maturity of the fruit. Styles are persistent on the fruits.

The exocarp of mature fruits was reported as brownish (*A. chinensis*) or reddish (*A. pusilla*, *A. japonica*, etc.) (Walker, 1940; Nakai, 1943; Chen, 1979), or blackish with longitudinal punctate dots (personal observation); the mesocarp is thin and fleshy; and the endocarp is more or less hardened.

The seed is round in outline and is similar to those of other species of *Ardisia* by having a membranous seed coat and a smooth endosperm surrounding its embryo. At one point on the seed surface there is an indentation, oblong in outline in a section of the seed, with a well-defined cavity. On one side of this cavity lies the radicle of the linear-shaped embryo with two cotyledons penetrating well into the endosperm.

RE-DEFINITION AND CLASSIFICATION

In this revisionary work, 26 species of subgenus *Bladhia* Mez are recognized and treated. Generally, these species fall into three groups. In the three groups, variability in the following gross characters plays a major role: the margin of leaves, phyllotxy, the kinds of inflorescence position, i. e. whether it arises from axils of leaves or hypsophylls, the shape of calyx-lobes, and the nature of the trichomes.

The first group is characterized by (1) the leaves alternate, coarse-dentate, undulate, or entire at the margin, (2) the inflorescence subumbellate and axillary from the leaves, (3) calyx-lobes triangular, and (4) the scales irregular-peltate. The species *A. chinensis* is the representative of this group.

The second group is delimited by the characters: (1) the leaves subopposite

or subverticillate, serrate or serrulate at the margin, (2) the inflorescences subumbellate, axillary from hypsophylls or rarely from both hypsophylls and leaves, (3) calyx-lobes long triangular or rarely ovate, and (4) hairs uniseriate or round capitate. Included in this group are *A. japonica*, *A. walkerii*, *A. pusilla*, *A. faberi*, and *A. maclurei*.

The third group is defined by (1) the leaves subopposite, subverticillate, or rarely alternate, fimbriate-serrulate at the margin, (2) the inflorescences subumbellate, racemose, or paniculate, axillary from both hypsophylls and leaves, (3) the calyx-lobes ovate, imbricate, (4) the hairs round and/or elongate-bicellular-capitate. The species in this group are: *A. bambusetorum*, *A. foliosa*, *A. maingayi*, *A. metallica*, *A. odontophylla*, *A. replicata*, *A. scalarinervis*, *A. pingbienensis*, *A. fimbriata*, *A. theaefolia*, *A. gigantifolia*, *A. curvistyla*, *A. balansana*, *A. perpendicularis*, etc.

Subgenus *Chinensia* (Nakai) Yang

A. chinensis of the first group was treated as a member of subgenus *Bladhia* by Mez (1902), then transferred to section *Crispardisia* Mez by Pitard (1930), to section *Chinensis* by Nakai (1943), and recently to section *Bladhia* Mez (Walker, 1940; C. Chen, 1979). The various classificational positions of this species were principally based on the viewpoints of the respective authors, i.e. how many characters were utilized and what kinds of characters were weighted. Mez (1902), Walker (1940), and Chen (1979) are those who stressed the subumbellate inflorescences and subshrubby habit. Nakai (1943) was the first of these to use more characters in aligning the species *A. chinensis* than the 2 characters mentioned above. In personal communication, Chen admitted that he reluctantly located the species in the subgenus *Bladhia* although he recognized the differences between group 1 and the combination of groups 2 and 3. The distinctions made in these systematic treatments as to those major gross morphology prompt me to exclude *A. chinensis* and *A. argenticaulis* from the original subgenus *Bladhia* Mez, and then to include them in subgenus *Chinensia* (Nakai) Yang.

After an overall study of the Asian subgenera of *Ardisia*, subgenus *Chinensia* was found to be related to subgenus *Akosmos* by the following characters: nearly entire leaves, many obscure lateral veins, alternate leaves, subumbellate inflorescence from the axil of a leaf, triangular calyx-lobes, and irregular peltate scales. They differ, however, with subgenus *Chinensia* having an herbaceous-like habit and a single series of ovules as opposed to subgenus *Akosmos* composed of shrubs or trees and having several series of ovules. Although Mez (1902) defined subgenus *Akosmos* as having numerous ovules in several series, one member, *A. rhomboidea* possesses several ovules in one series (see the Plate 1213 of Wight's Icones). In addition, *A. argenticaulis* has some flowers with ovules in two series. This clearly indicates that subgenus *Chinensia* and subgenus *Akosmos* may have similar variability in the number of series of ovules. These support the view that subgenus *Chinensia* is closely related to subgenus *Akosmos*. In view of the fact that I did not examine an adequate number of species of subgenus *Akosmos*, I am separating the subgenus *Chinensia* from the subgenus *Akosmos*. This accordingly suggests that a revisionary work of subgenus *Akosmos* is worth undertaking.

Geographically, the subgenus *Chinensia* is sporadically distributed in the Malay Peninsula, Vietnam, Taiwan, and the Ryukyus, but is mainly distributed in South and East Mainland China (Fig. 27). The collections of *A. chinensis* and *A.*

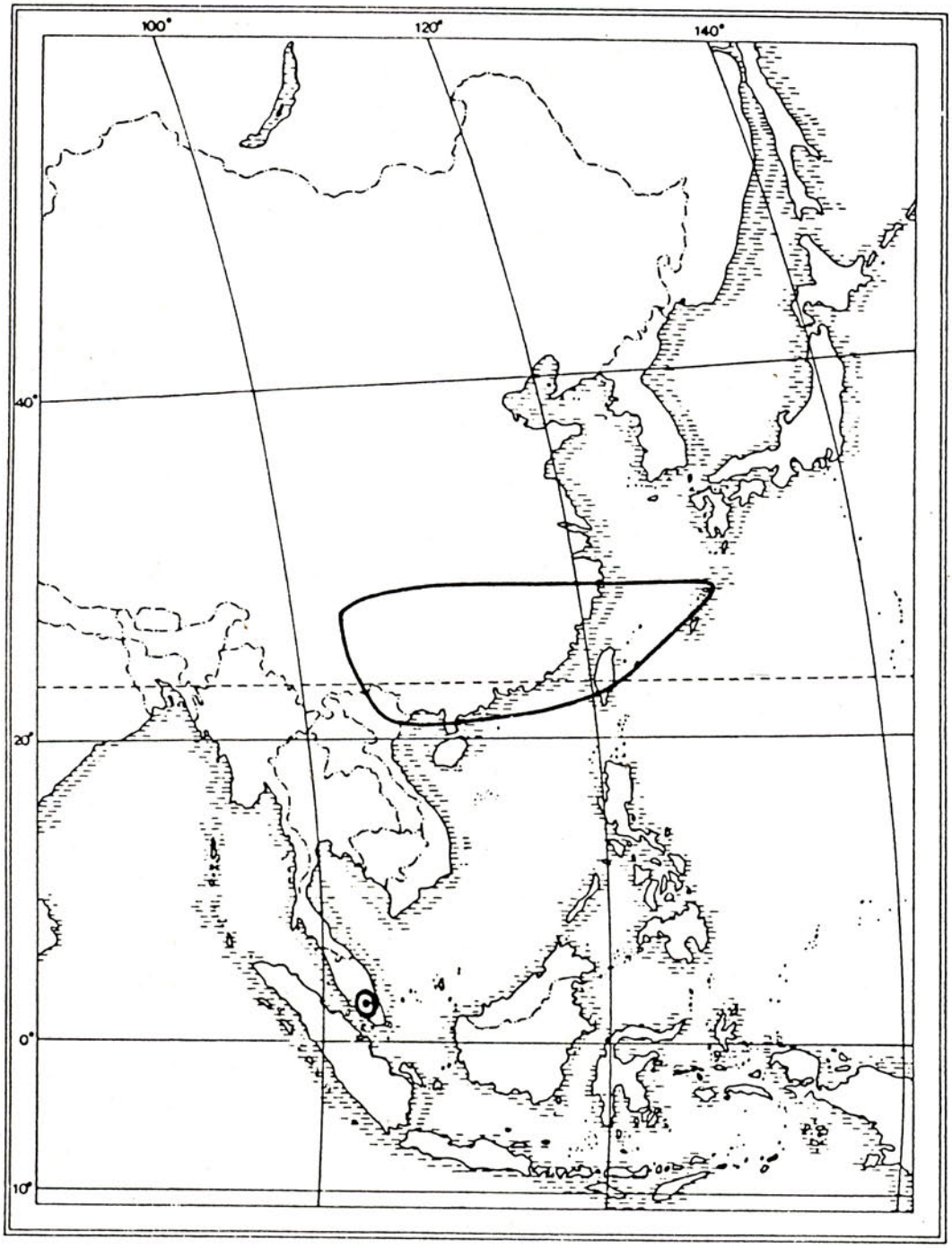

Fig. 27. Distribution of Subgenus *Chinensia*.

argenticaulis indicate that this is a subtropical subgenus (except for one collection made in the Malay Peninsula).

Subgenus *Bladhia* (Hornst.) Mez

After the separation of group 1 including *A. argenticaulis* and *A. chinensis*, from subgenus *Bladhia*, group 2 and group 3 are left with all remaining species with a comparable morphology. Thus subgenus *Bladhia* can then be redefined as having inflorescences subumbellate or racemose or paniculate and axillary from the hypsophylls or from both leaves and hypsophylls, the calyx-lobes ovate or lanceolate or long-triangular, leaves subverticillate or tufted with serrulate or serrulate-fimbriate margin, and trichomes occurring on both vegetative and reproductive organs.

In this reconstruction of subgenus *Bladhia*, two sections are recognized, based upon the characters mentioned previously. The two newly established sections are *Bladhia* and *Odontophylla*, one representing group 2 and the other group 3 respectively, as well as including the species listed previously. In section *Bladhia*, *A. japonica* is a distinct species which has some features distinguishable from those of other species. Its short uniseriate hairs and inflorescences axillary from both leaves and hypsophylls, two or three series of ovules, and semicraspedodromous venation readily separate it from the other four: *A. pusilla*, *A. faberi*, *A. maclurei*, and *A. walkerii*, and strongly support the establishment of subsection *Bladhia* to accommodate it. The other species, *A. pusilla* etc., are included in subsection *Faberi* which is delimited by long uniseriate hairs, subumbellate inflorescences axillary from hypsophylls only, mixed-craspedodromous venation, and one series of ovules. Since *A. walkerii* possesses a leaf shape similar to that of *A. japonica* and has slender peduncles and long uniseriate hairs like those of *A. pusilla*, it seems to be the intermediate linkage between these two subsections. Furthermore, *A. walkerii* is possibly the hybrid of *A. japonica* and *A. pusilla* (Walker, 1940; Ohwi, 1965).

In section *Odontophylla*, the members from a closely knit group except for *A. theaefolia*, *A. fimbriata*, *A. gigantifolia*, *A. curvistyla* and *A. cameronensis*. These five species are characterized by a common feature: round capitate hairs which are not found in other species.

However, *A. theaefolia* is the sole species in the section with exclusively alternate leaves. Additionally, the umbellate-paniculate inflorescence of *A. fimbriata* is very similar to that of *A. theaefolia*. Because of this similarity, subsection *Fimbriata* is regarded as including these two species, *A. theaefolia* and *A.fimbriata*.

Sharing the common characters of round-capitate hairs and curved styles (not obvious in *A. gigantifolia*), *A. curvistyla* and *A. gigantifolia* are segregated as a new subsection *Gigantifolia*.

Except for the five species of section *Odontophylla* mentioned above, all other species can be grouped under subsection *Odontophylla* by their gross morphological characters.

Although Mez (1902) did not indicate the close ally of subgenus *Bladhia*, subgenus *Crispardisia* may be the most likely candidate as he positioned it right before subgenus *Bladhia*. However, there is no adequate evidence to support this assumption. First of all, the corymbose or corymbose-paniculate inflorescence with short peduncles positioned at the apex of a lateral branch which has one to several leaves in front weakens such an assumption considerably. In addition, another

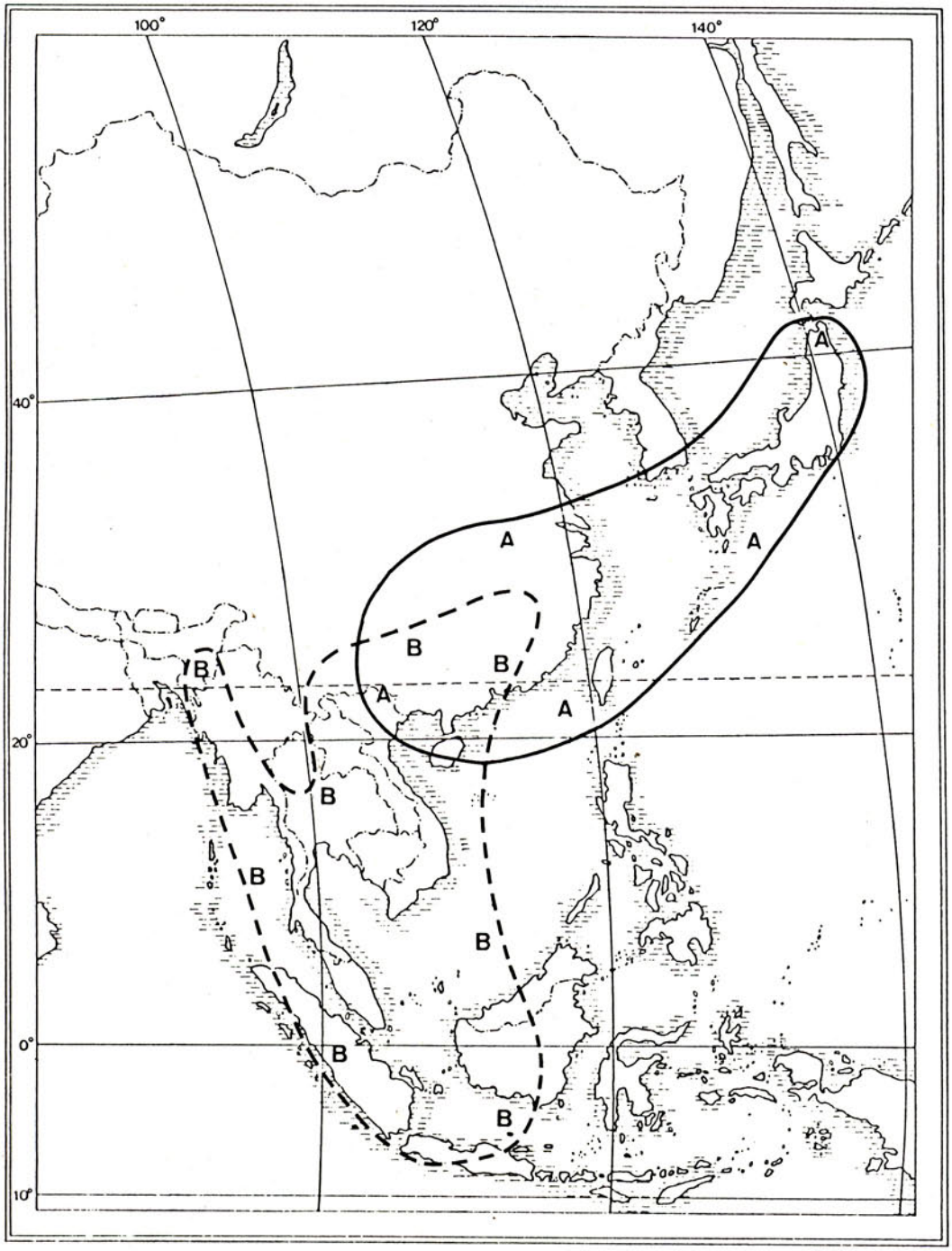

Fig. 28. Distribution of Subgenus *Bladhia* and Sections.
A: Distribution of Section *Bladhia*.
B: Distribution of Section *Odontophylla*.

kind of inflorescence in subgenus *Crispardisia*, the exclusively axillary subumbel, does not agree this assumption either. Furthermore, several morphological features seem to argue against these two subgenera being related: linear-like calyx-lobes with rounded apex, albuminous glands in the sinuses of leaves (the main character of this subgenus), and emarginate biseriate hairs.

Of the other subgenera, subgenus *Tinus* may be related to subgenus *Bladhia* since the former has subumbellate or subumbellate-paniculate inflorescences axillary from both leaves and hypsophylls. However, the glabrous plant body, the entire leaf margin, the round calyx-lobes, the several series of ovules, and the arborescent or large shrubby habit of subgenus *Tinus* controvert this opinion. The question concerning the relationship between subgenera *Tinus* and *Bladhia*, however, is still open.

Phytogeographically, the subgenus *Bladhia* is widely distributed from Assam, the northeast of India, eastward to Malay Peninsula, Java, Borneo, Indochia, the Philippines, South and East Mainland China, Taiwan, the Ryukyus, Japan, and Korea. Such a distributional range extends from tropical, subtropical, through warm temperate, to cool temperate zones (Fig. 28).

Section *Bladhia* is mostly restricted to the subtropics and the temperate zones in spite of the fact that a few collections were made in the tropics. So far, only two collections of *A. pusilla* were made in tropical zones, one in South Thailand and the other in the Philippines. Of the species in section *Bladhia*, *A. pusilla* has the widest distributional range extending from the tropics to the temperate zone, i. e. from Thailand, the Philippines, northward to the Ryukyus, and Japan. However, *A. japonica* possibly has the northernmost distributional range extending to Hokaido island, Japon (Fig. 30). In the section *Bladhia*, members are almost evenly distributed geographically, e. g. three species, *A. japonica*, *A. pusilla*, and *A. walkerii* (endemic to Japan and possible hybrid of the first two species), in Japan, three species (*A. japonica*, *A. pusilla*, and *A. maclurei*) in Taiwan, three species (*A. maclurei*, *A. faberi* and *A. pusilla*) in Hainan, four species (*A. japonica*, *A. pusilla*, *A. maclurei*, and *A. faberi*) in Mainland China.

Section *Odontophylla* is mainly limited to the tropics and the subtropics. The southernmost limit of its range is Java, the northernmost is Yunnan and Kwangtung, China (Fig. 28). However, the species of this section are mostly restricted to the Malay Peninsula, and Tonkin, Vietnam, and South Yunnan, China.

It is worth indicating that the sympatric area of the two sections, *Bladhia* and *Odontophylla*, is rather limited. Except for the presence of *A. pusilla* in Thailand and the Philippines, the sympatric distribution of the two sections is at North Tonkin, and Hainan, Kwangsi and Kwangtung, the southeast of Mainland China.

SYSTEMATIC TREATMENT

KEY TO THE SUBGENERA, SECTIONS, SUBSECTIONS AND SPECIES

1. Leaves with margins entire or undulate, pubescent with brown irregular peltate scales beneath; stems without hypsophylls. (Subgenus **Chinensia** (Nakai) Yang)
2. Stems silvery-grey; leaves membranous, the lateral veins not uniting to form a distinct marginal vein; calyx-lobes greenish brown, triangular-lanceolate.... .....25. *Ardisia argenticaulis* Yang

2. Stems brown-grey; leaves chartaceous, the lateral veins uniting to form a distinct marginal vein; calyx-lobes brown, triangular.....
.....26. *Ardisia chinensis* Benth.

1. Leaves with margins fimbriate-serrulate (refers to the teeth having drawn out into a relatively long acumen at the apex), serrulate, or serrate, pubescent with uniseriate hairs or capitate hairs beneath; stems with hypsophylls. (Subgenus I. **Bladhia** (Thunb.) Mez)
3. Young stems, the undersurface of leaves, and inflorescences pubescent with uniseriate and short round-capitate hairs. (Sect. 1. **Bladhia**: Subsect. 2. **Faberi** Yang)
4. Leaves subcoriaceous, lustrous, the reticulate veins conspicuous (fresh material); sepals triangular or triangular-ovate, about half the length of petals..
.....5. *Ardisia walkerii* Yang
4. Leaves chartaceous, not lustrous, the reticulate veins obscure; sepals lanceolate or long-triangular, usually more than 6/10 of petals in length.
5. Leaves broadly acute or obtuse at apex, the lateral veins usually 4-5 pairs; peduncle slender; sepals about 2/3 length of petals, 1-veined; ovules 6-7.....
.....4. *Ardisia pusilla* A. DC.
5. Leaves acute at apex, the lateral veins more than 7 pairs; peduncle stout; sepals slightly less than or equal to the petals in length, 3-5-veined; ovules 4-5.
6. Leaves obovate, cordate at base; sepals narrowly lanceolate; corolla-lobes not punctate .....3. *Ardisia maclurei* Merr.
6. Leaves elliptic or oblanceolate, acute or cuneate at base; sepals narrowly triangular; corolla-lobes punctate.....2. *Ardisia faberi* Hemsley
3. Young stems, the undersurface of leaves, and inflorescences pubescent with short round-capitate hairs only or elongate-bicellular-capitate hairs.
7. Leaves subcoriaceous, lustrous, the reticulate veins conspicuous and slightly raised on both surfaces; young stems, petioles, and inflorescences pubescent with dense short round-capitate hairs; ovules 13–16 in 2–3 whorls. (Subsect. 1. **Bladhia**).....1. *Ardisia japonica* (Hornst.) Blume
7. Leaves membranous, subchartaceous, or chartaceous, not lustrous, the reticulate veins obscure, not raised on both surfaces; young stems, petioles, and inflorescences pubescent with elongate-bicellular capitate hairs, or with sparse short round-capitate hairs; ovules 5–13 in a whorl. (Sect. 2. **Odontophylla** Yang)
8. Young stems, leaves, and inflorescences nearly glabrous with sparse minute round-capitate hairs only.
9. Petioles conspicuously winged. (Subsect. 2. **Gigantifolia** Yang)
10. Leaves with margins fimbricate-serrulate, punctate with orange dots; inflorescences paniculate or compound paniculate, more than 20 cm long, stout; calyx-lobes not punctate; anthers obtuse at apex.....
.....8. *Ardisia gigantifolia* Stapf
10. Leaves with margins obtuse-serrulate, punctate with minute blackish dots; inflorescences subumbellate-paniculate, less than 20 cm long, rather slender; calyx-lobes blackish punctate; anthers emarginate at apex.....
.....9. *Ardisia curvistyla* Yang
9. Petioles not winged. (Subsect. 1. **Fimbriata** Yang)

11. Leaves alternate, elliptic, less than 10 cm long, the lateral veins less than 10 pairs.....7. *Ardisia theaefolia* King & Gamble
11. Leaves subverticillate, oblong or oblong-ovate, more than 15 cm long, the lateral veins more than 13 pairs.....6. *Ardisia fimbriata* Fletcher

8. Young stems, leaves, and inflorescences conspicuously pubescent with elongate-bicellular-capitate hairs (except *Ardisia cameronensis* mixed with round-capitate hairs). (Subsect. 3. **Odontophylla** Yang)
12. All petioles winged, or the wing deccurrent to the base except for 1-5 mm from the node.
13. Young stems, undersurface of leaves, and inflorescences villose or tomentose; inflorescences more than 14 cm long.
14. Young stems, undersurface of leaves, and inflorescences tomentose; calyx-lobes long-ovate, densely punctate..... .....20. *Ardisia ramondiaeformis* Pitard
14. Young stems, undersurface of leaves, and inflorescences villose; calyx-lobes triangular-ovate, slightly punctate.....24. *Ardisia velutina* Pitard
13. Young stems, undersurface of leaves, and inflorescences puberulous or nearly glabrous; inflorescences less than 12 cm long.
15. Hypsophylls cordate, caudate at apex; rachis of inflorescences very short, 1-3 mm long.....23. *Ardisia silvestris Pitard*
15. Hypsophylls otherwise; rachis of inflorescence more than 5 mm long.
16. The first or lowermost 3-4 pairs of lateral veins of leaves perpendicular to the midrib or nearly so; leaves broad-elliptic or broad-oblanceolate.
17. Lateral veins less than 13 pairs (mostly 8-9); inflorescences mostly racemose (very rarely subumbellate-paniculate); leaves usually less than 10 cm long.....12. *Ardisia botryosa* Walker
17. Lateral veins more than 15 pairs; inflrorescences subumbellate-paniculate; leaves more than 13 cm long..... .....18. *Ardisia perpendicularis* Walker
16. The first or lowermost 3-4 pairs of lateral veins of leaves oblique to the midrib; leaves elliptic or oblanceolate.
18. Leaves 4-5 subverticillately disposed; the wing of the petiole decurrent to the base except for 1-5 mm from the node; young stems and undersurface of leaves and inflorescence pubescent with both round-capitate and elongate-bicellular-capitate hairs.....15. *Ardisia cameronensis* Yang
18. Leaves usually 3 subverticillately disposed; petioles winged to the base; young stems and undersurface of leaves and inflorescences pubescent with elongate-bicellular-capitate hairs only..... .....10. *Ardisia balansana* Yang

12. Petioles more than 7 mm long, not or slightly winged at the upperpart.
19. Leaves linear..... 13. *Ardisia foliosa* Furtado
19. Leaves ovate, obovate, oblanceolate, or elliptic.
20. Leaves with lateral veins more than 28 pairs.
21. Leaves long-obovate or oblanceolate; inflorescence umbellate, sessile or subsessile; sepals not punctate.....22. *Ardisia scalarinervis* Walker
21. Leaves broad-elliptic; inflorescences umbellate-paniculate, pedunculate; sepals punctate.....19. *Ardisia pingbienensis* Yang
20. Leaves with lateral veins less than 25 pairs.
22. Leaves conspicuously subverticillate.

23. Petioles of mature leaves more than 3.5 cm long.....
.....17. *Ardisia odontophylla* Wall. *ex* A. DC.
23. Petioles of mature leaves less than 3.5 cm long.
24. Leaves punctate with numerous minute blackish round and longitudinal dots in colorless or light-yellow under transillumination; ovary conspicuously pubescent.....14. *Ardisia maingayi* (Clarke) King & Gamble
24. Leaves punctate with many orange round dots; calyx-lobes conspicuously punctate; ovary glabrous .....
.....11. *Ardisia bambusetorum* King & Gamble
22. Leaves alternate, subopposite, or tufted at the uppermost part of short stems.
25. Leaves inequilateral at base; inflorescences longer than 14 cm; calyx-lobes densely villose and punctate....20. *Ardisia ramondiaeformis* Pitard
25. Leaves not inequilateral at base; inflorescences less than 8 cm long; calyx-lobes punberulous and slightly punctate.
26. Leaves usually ovate; petioles usually more than 2.5 cm long; inflorescens racemose .....21. *Ardisia replicata* Walker
26. Leaves usually obovate; petioles usually less than 2.5 cm long; inflorescences subumbellate.....16. *Ardisia metallica* N. E. Brown

DESCRIPTION OF TAXA

I. **Ardisia** subgenus **Bladhia** (Thunb.) Mez in Engler, Pflanzenr. **9** (IV. 236): 150. 1902. descr. emend.

Type species. *Ardisia japonica* (Hornstedt) Blume.

Description. Plants either small, ascending or creeping subshrubs, or erect shrubs, usually rhizomatous; pubescence of round-capitate or seriate or both or elongate-bicellular-capitate hairs on young stems, petioles, undersurface or both surfaces of leaves, and inflorescences. Hypsophylls present, linear or lanceolate or oblanceolate or deltoid. Leaves opposite or subverticillate or very rarely alternate, serrulate or fimbriate-serrulate. Inflorescences subumbellate or subumbellate-paniculate or paniculate, axillary from both normal leaves and hypsophylls. Calyx-lobes ovate or lanceolate; ovules 4–12 in 1 or 2 or 3 whorls (occasionally 2 in *A. walkerii* Yang and 2–3 in *A. japonica* (Hornstedt) Blume.)

Sect. 1. **Ardisia** subgenus **Bladhia** (Thunb.) Mez sect. **Bladhia**.

Type species. *Ardisia japonica* (Hornstedt) Blume.

Description. Plants a small shrub with a creeping rhizome, pubescent with short round-capitate hairs on young stems, petioles, undersurface of leaves, and inflorescences. Hypsophylls present, oblanceolate, pubescent. Leaves subverticillate, subcoriaceous, serrulate, the lateral veins prominent, the reticulate veins distinct. Inflorescences umbellate or rarely umbellate-paniculate, axillary from hypsophylls or sometimes from leaves; calyx-lobes ovate or rarely long-ovate; ovules many in 2–3 whorls.

Subsect. 1. **Ardisia** subgenus **Bladhia** (Thunb.) Mez sect. **Bladhia** Mez subsect. 1. **Bladhia**

Type species. *Ardisia japonica* (Hornstedt) Blume.

1. **Ardisia japonica** (Hornstedt) Blume, Bijdr. Fl. Neederl. Ind. 690. 1826; A. DC. in

Trans. Linn. Soc. **17**: 123. 1834; Dietrich, Syn. Pl. 1: 617. 1839; Steudel, Nomenclator Botanic. ed. 2. 122. 1841; A. DC. in DC., Prodr. 8: 135. 1844; Mez in Pflanzenr. **9**(IV. 236): 151. 1902. excl. syn. *Bladhia glabra* Thunb., *A. glabra* A. DC., *A. montana* Sieb. *ex* Miq., *Tinus montana* (Miq.) Kuntze, & *A. japonica* var. *montana* Miq.; Miq., Ann. Mus. Bot. Lugd. Bat. **2**: 262. 1866; Franchet & Savatier, Enum. Pl. Jap. 1: 505. 1875. excl. syn. *Bladhia glabra* Thunb.; Forbes & Hemsl., Index Fl. Sin. 65. 1889; Diels in Bot. Jahrb. **29**: 518. 1901; Sargent, Pl. Wilsoniana **2**: 582. 1916. excl. syn. *Bladhia glabra* Thunberg; Nakai, Fl. Sylvatica Koreana **13**: 13. fig. 2. 1923; Makino & Nemoto, Fl. Jap. 394. 1925; Hand-Mazzetti in Symb. Sinic. **7**(4): 757. 1936; Walker in Bull. Fan. Mem. Instit. Biol. Bot. **9**(3): 167. 1939, in Philipp. Journ. Sci. Bot. **73**: 134. 1940, in Sci. Bull. Univ. Ryukyus **2**: 74. fig. 8. (quoad drawing) & fig. 7 (quoad expl.), & in Quart. Journ. Taiwan Mus. **12**: 182. excl. fig. 14; Hui-Lin Li, Woody Fl. Taiwan 714. 1963; Ohwi, Fl. Jap. 713. 1965 (Engl. ed.); C. Y. Wu & C. Chen Fl. Yunnanica 1: 357. 1977; Li in Li *et al.*, Fl. Taiwan **4**: 52. 1978; C. Chen in Agend. Academic. Sinic., Fl. Reipubl. Popul. Sinic. **58**: 90. 1979.

Ardisia japonica (Hornstedt) Blume var. *angusta* Makino & Nemoto, Fl. Jap. 394. 1925; Ohwi, Fl. Jap. 713. 1965 (Engl. ed.), *syn. nov.*

Ardisia japonica (Hornstedt) Blume var. *angusta* Nakai apud Makino & Tanakai, Man. Fl. Nippon 439. 1927, *syn. nov.*

Ardisia japonica (Hornstedt) Blume var. *belogorum* A. DC. in DC., Prodr. 8: 135. 1844, *syn. nov.*

Ardisia japonica (Hornstedt) Blume var. *tricolor* Rehnelt in Parey's Blumengartn. **2**: 148. 1932, *syn. nov.*

Ardisia japonica (Hornstedt) Blume var. *major* (Nakai) Walker in Bot. Mag. Tokyo **67**: 203. 1954.

Ardisia japonica (Hornstedt) Blume var. *minor* (Nakai) Walker in Bot. Mag. Tokyo **67**: 203. 1954.

Bladhia japonica Hornstedt in Thunberg, Nov. Gen. Pl. I, 6. t. l. 1781 & Fl. Jap. 1: 96. t. 18. 1784; C. H. Persoon, Synopsis Plantarum 1: 233. 1805; Roem. & Schult., Syst. 4: 512. 1819; Nakai in Tokyo Bot. Mag. **35**: (98). 1921 & in Nakai & Honda, Nov. Fl. Jap. **9**: 31. 1943.

Bladhia japonica Hornstedt var. *angusta* Nakai, Trees & Shrubs Jap. 1: 203. 1922, in Tokyo Bot. Mag. **38**: 41. 1924, & Trees & Shrubs Jap. ed. 2. 1: 279. fig. 131. 1927, *syn. nov.*

Bladhia japonica Hornstedt var. *minor* Nakai & Suzuki in Nakai & Honda, Nov. Fl. Jap. **9**: 42. 1943. *syn. nov.*

Bladhia japonica Hornstedt var. *typica* Nakai in Nakai & Honda, Nov. Fl. Jap. **9**: 32. 1943.

Tinus japonica (Hornstedt) Kuntze, Rev. Gen. Pl. 2: 405. 1891. **Fig. 29**

A small or scandent shrub up to 30 cm high, with a creeping rhizome; stems ascending, puberulous with short round-capitate hairs when young, glabrate when mature; hypsophylls deciduous, membranous, oblanceolate or linear-oblanceolate, 2–10 mm long, acuminate or cuspidate at the apex, ciliate to minutely serrulate, sparsely punctate, glabrous; leaves opposite or subverticillate, chartaceous, narrowly elliptic-ovate or broadly elliptic-ovate or elliptic, 1.3–8.8 cm long, 0.8–4.2 cm wide, acute or slightly acuminate at the apex, acute or attenuate at the base, serrate, glabrate, puberulous with short round-capitate hairs on the midrib beneath, minutely punctate, the midrib slightly raised above and distinctly raised beneath,

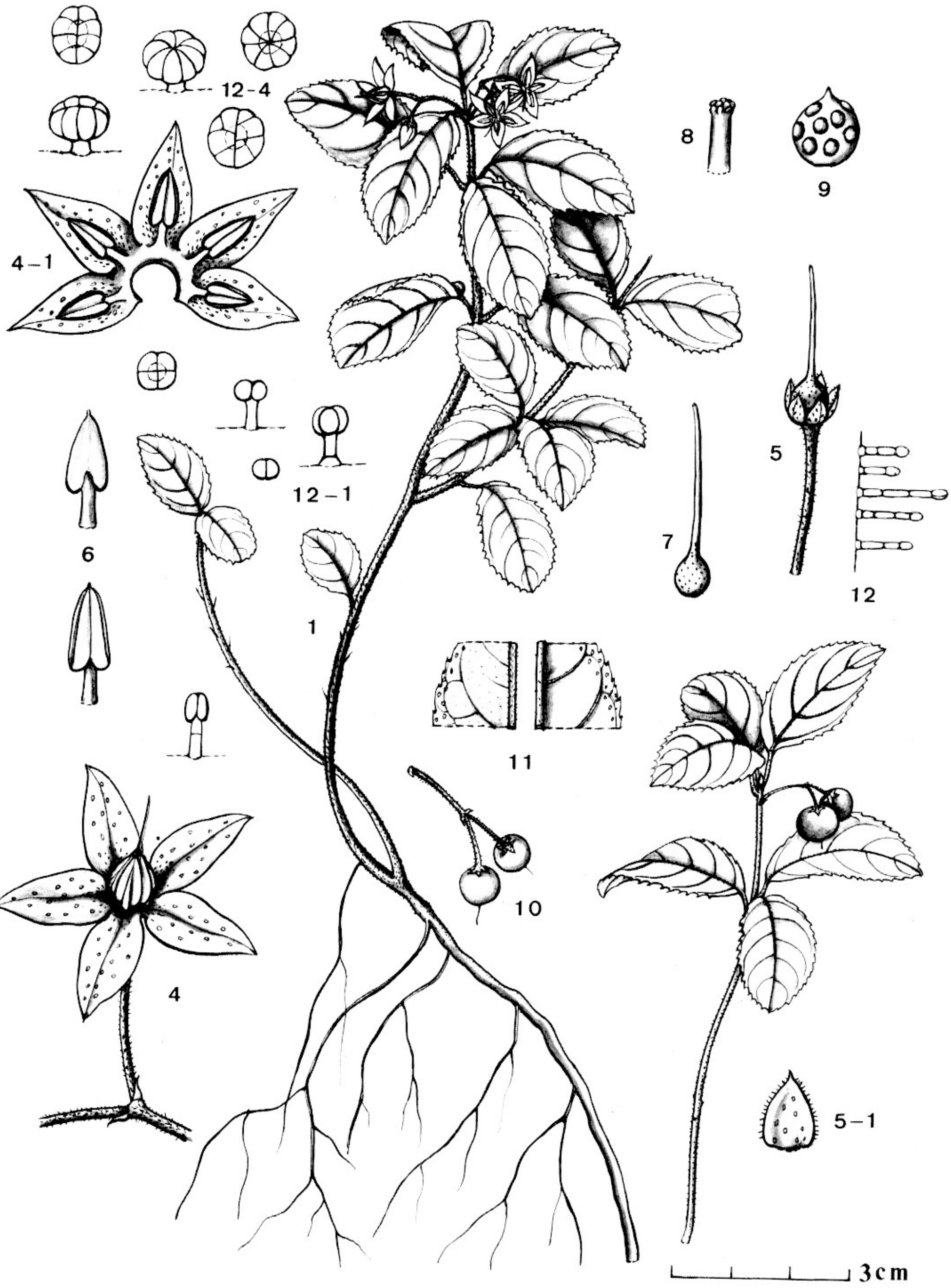

Fig. 29. *Ardisia japonica* (*Lu s.n.* Dec. 12, 1985). 1. Habit; 4. Flower; 4-1. Petals and stamens; 5. Pedicel with calyx and a pistil; 6. Stamens; 7. Pistil; 8. Stigma; 9. Ovules on a placenta; 10. Fruit; 11. Magnified part of leaf margin; 12. Uniseriate hairs; 12-1. Round-capitate hairs; 12-4. Round-peltate scales.

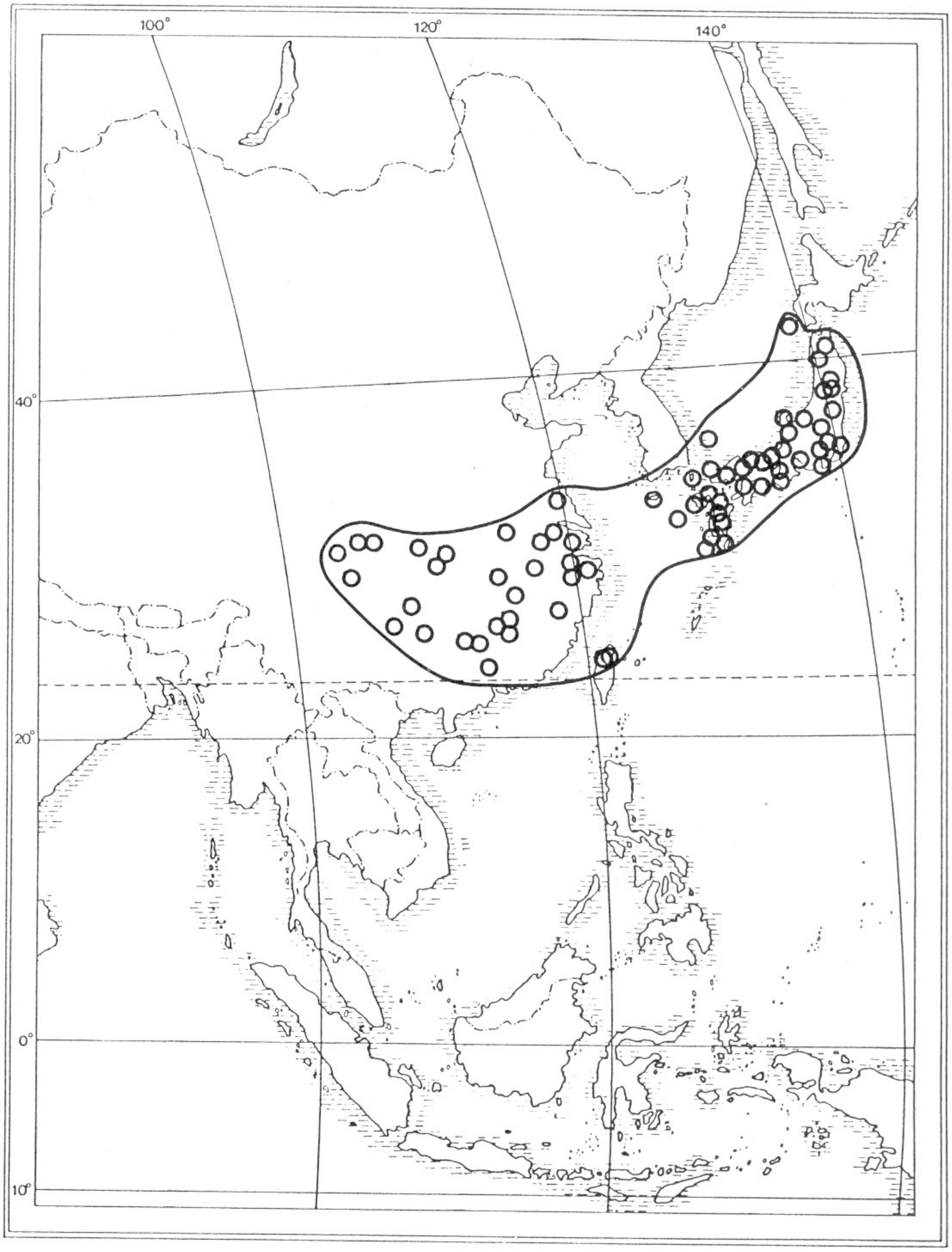

Fig. 30. Distribution of *Ardisia japonica*.

the lateral veins 5–8 pairs, distinct on both surfaces, the reticulate veins conspicuous; petioles 2–12 mm long, puberulous with short round-capitate hairs. Inflorescences subumbellate or rarely subumbellate-paniculate, axillary from hypsophylls or normal leaves; peduncle 0.3–1.9 cm long, at most twice the length of the pedicels, puberulous with short round-capitate hairs; pedicels 0.4–1.3 cm long, puberulous with short round-capitate hairs; sepals united near the base, the lobes broad- or linear-ovate or ovate, 1–2 mm long, acute at the apex, ciliate, glabrate outside, punctate with orange dots along midvein; corolla-lobes ovate or broadly ovate, 3–6 mm long, 2.3–3.5 mm, obtuse at the apex, minutely papillate or glabrous inside, glabrous outside, black- and red-punctate; filaments ca. 1 mm long, glabrous; anthers ovate, acute at the apex, sagittate at the base, punctate on the back; ovary globular-ovate, glabrous or minutely punctate; style slender, glabrous; ovules 13–16 into 2–3 whorls. Fruit globose, slightly compressed, red, 5–6 mm in diameter, glabrous, somewhat punctate.

Typification. In his original description, Hornstedt did not list any exsiccatae for this species. Since the species was published in Thunberg's *Nova Genera Plantarum* in 1781, the microfiche of the *Ardisia* specimens of Thunbergian Herbarium at UPS was examined. The characters found in number *5575*, labelled as *Bladhia japonica*, match those in Hornstedt's description. This number is accordingly designated as the lectotype of the species, recorded as being collected at Nagasaki, Kyushu, Japan.

Distribution. China, the Ryukyus (?), Japan, and Korea. (Fig. 30).

Ecology. Plants grow in thick forests and shady or wet places. Flowering specimens were collected in June through August. Fruiting specimens were gathered in September through December.

Additional specimens examined. **CHINA**. Anhwei: Tien-chu-shan, *C. S. Fan et Y. Y. Li 36* (A). Checkiang: Hangchow, *R. C. Ching 3727* (UC), *A. N. Steward 1463* (UC) *et 2382* (A); Ningpo, *D. MaCgregor s. n.* in 1908 (A); Tien-mu-shan, *C. Y. Chiao 1142* (UC), *et 1444* (US); Tien-tai Shan, *C. Y. Chiao s. n.* in 1927 (E), *et 1444* (US); no further locality, *Barchet 469* (MO). Fukien: Kuliang, *H. H. Chung 6656* (NY). Hunan: Changning, *C. S. Fan et Y. Y. Li 67* (A); Ichang, *W. T. Tsang 23566* (A); Sinning, *C. S. Fan et Y. Y. Li 630* (A); no further locality, *v. Handel-Mazzetti 2271* (E). Hupeh: Chienshih, *H. C. Chow 1752* (E, NY, US); Enshih, *H. C. Chow 1884* (A, NY); Patung, *H. C. Chow 719* (A, NY,US); Lichuan, *Sino-Amer. Exped. 1926* (A, NA); Shenlungchia, *K. S. Chow 31035* (NY); no further locality, *A. Henry 98, E. H. Wilson 670.* Kiangsi: Lingchuan, *Y. Tsiang 9824* (NY); Lu-shan, *A. N. Steward s. n.* in 1923 (UC). Kiangsu: Bauhwashan, Anonymous *s. n.* in 1915 (UC); Chue-yuon, Anonymous *612* (MO, NY); Yuntaishan, *K. Yao 8500* (NA); Swe-chuen, *H. H. Hu s. n.* in 1921 (A); no further locality, *d'Argy s. n.* (E). Kwangsi: I-hsing, *K. Ling 2581* (A); Kwei-lin, *W. T. Tsang 28006* (A, UC); Lu-shan, *H. H. Chung et S. C. Sun 415* (A). Kwangtung: Lin-hsien, Anonymous *s. n.* in 1918 (MO, NA); Nip-doo to Chang-kiang, *W. Y. Chun 5750* (A); Yang-shan, *T. M. Tsui 492* (A, L, MO, NA, NY, UC). Szechuan: Cheng-tu. *W. P. Fang 12443* (A); Kuan-hsien, *W. P. Fang 2045* (E), *2090* (A, E), *2151* (A, E), *et 19732A* (A), *W. K. Hu 9273* (A); Omei, *C. Y. Chiao et C. S. Fang 328* (A), *F. Faber 4257* (K); Tien-chuan, *W. P. Fang 3467* (A, E). Kweichow: Fanching-shan, *A. N. Steward, C. Y. Chiao et H. C. Cheo 426* (A, NY, US), *Y. Tsiang 7508* (US); Kiangkow, *Y. Tsiang 7515* (NY, US); Kweiting, *Y. Tsiang 5513* (E, K, NY); Lei-shan, Anonymous *51047* (KUN). Taiwan: Ilan, *E. W. Wood 3831* (A), *M. T. Kao 3216* (TAI); Taipei, *Shie 1003* (TAIF), *T. Suzuki 14525* (TAI). Yunnan: Pin-fa,

J. Cavalerie 775 (E). **JAPAN.** Hokaido: Okushiri, *K. M. et Y. T. s. n.* in 1890 (A). Honshu: Akita, *U. Faurie 2150* (MO); Awaji, *H. Muroi 5055 et 5244* (A); Chiba, *M. Furuse s. n.* in 1958 (A) *et* in 1962 (A); Hiroshima, *J. Shiraga s. n*, in 1909 (TAIF); Hygo, *H. Muroi 3356* (A) *et 4860* (A); Ishikawa, *H. Muroi 2277* (A), *F. G. Meyer, L. Creech et S. G. March 16844* (NA); Iwate, *H. Muroi 4690* (A); Idzu (Oshima Isl.), *M. Mizushima 569* (A), *M. Mizushima et U. Mizushima 827* (A); Kobe, *H. Muroi 2932* (A); Kyoto, *H. Tagasi 890* (E, GA, NA, NY, US), *M. Hiroe 12146* (UC); Mino, *K. Shiota 3219* (A) *et 5794* (A); Miyagi, *H. Mori et H. Okazaki s. n. in* 1973 (MO), *E. H. Wilson 7054* (A); Miye, *H. Muroi 2574* (A) *et 2599* (A); Nagasano, *M. Mizushima 11663* (A); Nara, *K. Sakurai s. n.* in 1906 (A); Niigata, *Y. Ikegami 100 b* (A); Okayama, *H. Muroi 4831* (A), *K. Uno 1602* (NY) *et 1604* (NY); Ochi, Anonymous *s. n.* in 1888 (GA); Osaka, *H. Muroi 6665* (A) *et 6765* (A); Sayo, *S. Arimoto s. n. in* 1903 (GA); Sendai (Miyagi), *J. G. Jack s. n.* in 1927 (GA); Shiga, *Boufford 22708* (A); Tochigi, *M. Mizushima 1654* (A); Tokyo, *Shiraga s. n.* (TAIF), *T.-Suzupi s. n.* in 1949 (A, UC); Yamaguchi, *L. A. Charette 1521* (MO), *H. Migo s. n.* in 1954 (A); Yamanashi, *S. Kitamura s. n.* in 1930 (A); Yokohama, *Maximowicz s. n.* in 1862 (A, GH, K, NY), *R. Oldham s. n.* in 1861 (K); Yokosuka, *M. Savatier 801* (K, US); Wakayama, *K. Shiota 3221 et 5365* (A), *M. Togashi 7201* (BM, E, K, NY, TAI). Kyushu: Kirisima Mt., *S. Suzuki 7877* (TAI); Yakusima, *Masamune s. n.* in 1924 (NY). **KOREA.** Cheju Isl., *In-cho Chung 1048* (F), *U. Faurie 736* (E), *1898* (A, E), *Taquet 1094* (A, E, UC), *2977* (E), *4308* (E), *E. H. Wilson 9536* (A); Dagelet Isl., *E. H. Wilson 8546* (A); Tsu-sima Isl., *C. Wilford 679* (GA); Ullung Isl., *O. Yongsok 6107* (F).

Note. The species is rather variable. In the many specimens examined, the leaf-shape varies from elliptic to linear-elliptic, the leaf length from 1.3 cm to 8.8 cm, and the shape of calyx-lobes from ovate to linear-ovate.

The species is widely cultivated in Japan. Four varieties and many forms had been described by Nakai in his publication (1943) in *Nova Flora Japonica* (edited by Nakai and Honda). Since the forms described are principally from cultivated material and no specimens are available or have been traced (Walker, 1954), they are omitted from this treatment. One variety, previously described by Nakai (1925), as well as three of his newly described varieties: namely, var. *angusta*, var. *typica*, var. *major*, and var. *minor*, are here treated as *A. japonica*. They cannot be readily distinguished, so great is the intergradation of characters.

Subsect. 2. **Ardisia** subgenus **Bladhia** (Thunb.) Mez subsect. 2. **Faberi** Yang, *subsect. nov.*

Type species. *Ardisia faberi* Hemsl.

Description. Folia subverticillata, serrulata vel serrata. Inflorescentiae umbellatae vel rarissime umbellato-paniculatae, axillares ex bracteis orientes. Calycis lobi lanceolati vel longo-triangulares. Ovula 5–8 uniseriatim disposita.

Plants mostly with a long creeping rhizome, pubescent with short round-capitate and uniseriate hairs on young stems, petioles, undersurface of leaves, and inflorescences; internodes of stem usually elongate. Hypsophylls present, linear or narrowly oblanceolate. Leaves subverticillate, serrulate or serrate, the lateral veins prominent, the reticulate veins obscure. Inflorescences umbellate or rarely umbellate-paniculate, axillary from hypsophylls; calyx-lobes lanceolate or long-triangular; ovules 5–8 in a whorl.

Note. This subsection includes four species. *Ardisia walkerii* Yang is possibly a hybrid of *Ardisia pusilla* A. DC., a member of this subsection, and *A. japonica*

(Hornst.) Blume. As the characters most closely approach those of *A. pusilla*, it is assigned under this subsection.

2. **Ardisia faberi** Hemsl. in Journ. Linn. Soc. Bot. **26**: 64. 1889; Mez in Engl., Pflanzenr. **9** (IV. 236): 153. 1902; Walker in Bull. Fan. Mem. Inst. Biol. Bot. **9**: 166. 1939 & in Philipp. Journ. Sci. Bot. **73**: 133. 1940; C. Y. Wu & C. Chen, Fl. Yunnanica **1**: 355. 1979; C. Chen in Agend. Academ. Sinica, Fl. Reipubl. Popul. Sinic. **58**: 88. 1979.

Ardisia castaneifolia Leveille in Feede, Report. Sp. Nov. **9**: 461. 1911.
Ardisia cavaleriei Leveille in Fedde, Repert. Sp. Nov. **10**: 374. 1912.
Tinus faberi (Hemsl.) Kuntze, Rev. Gen. Pl. **2**: 974. 1891.
Ardisia faberi Hemsl. var. *oblanceifolia* C. Chen in Anonymous, Fl. Hainanica **3**: 576. 1974 & in Agend Academ. Sinica, Fl. Reipubl. Popul. Sinic. **58**: 88. 1979.
Fig. 31

A small shrub up to 30 cm high, with a creeping rhizome; stems ascending, densely pilose with uniseriate and short round-capitate hairs when young, nearly glabrous when mature; hypsophylls subchartaceous, narrowly oblanceolate, 5–15 mm long, acuminate at the apex, pilose on both sides; leaves subverticillate, or rarely opposite, chartaceous, elliptic or rarely lanceolate- or oblanceolate-elliptic or oblanceolate, 4–10 cm long, 1.5–4 cm wide, acuminate or acute at the apex, attenuate or acute at the base, mostly densely pilose (rarely glabrate) with long uniseriate and round-capitate hairs on both surfaces, crenate or serrate, the midrib slightly canaliculate above and conspicuously raised beneath, the lateral veins 7–14 pairs, plane above, raised beneath; petioles 3–10 mm long, densely pilose. Inflorescences subumbellate, axillary from hypsophylls, pubescent with long uniseriate and round-capitate hairs; peduncle densely pilose, 1.5–2.5 cm long; pedicels pilose or densely pilose, 6–12 mm long; bracteoles 4–10 mm long; sepals united 1/4–1/6 their length, narrowly lanceolate or linear, 3–6 mm long, ca. 1 mm wide, pilose outside, glabrous inside, slightly punctate, conspicuously 3- or 5-veined; corolla-lobes white or pink, broadly ovate, 4–5 mm long, obtuse or acute at the apex, glabrous, punctate; stamens 1.3–1.7 mm long; anthers ovate, not punctate; filaments ca. 1 mm long, connate at the base; ovary glabrous, ovate; ovules 5–6 in a whorl. Fruit globose, ca. 6 mm in diameter, red, glabrous.

Typification. The type of this species was originally described by Hemsley. Since he specified *A. Henry 3304* and *Faber 795* as types, I herewith designate *Faber 795* at Kew, collected in Szechuan, Mainland China, as the lectotype. The isolectotype is at A.

Distribution. Mainland China. (Fig. 32).

Ecology. Most of the collections examined do not have field observations. A few, provided with field notes, were gathered in dense forests at 450 to 2200 meters.

Additional specimens examined. **CHINA.** Hupeh: *A. Henry 98* (US), *3304* (E), and *6237* (BM, G, NY), *E. H. Wilson 1192* (A, K, NY); Patung, *Ho-chang Chow 687* (A, NY). Kwangsi: Tung-loo, *R. C. Ching 5634* (A, NY, US). Kweichow: Hsu-feng, *S. W. Teng 90569* (A); Pin-fa, *Cavalerie 751* (E, syntype of *A. castaneifolia* Levl.), *Esquirol s. n.* in 1905 (E); Tou-chan, *Cavalerie s. n.* in 1899 (E, syntype of *A. castaneifolia* Level.). Szechuan: Nan-chuan, *W. P. Fang 1246* (A, E, K, NY) *et 5754* (E, G, K); Mt. Omei, *H. C. Chow 8300* (A), *W. P. Fang 16738* (A). Yunnan: Goang-nan, *C. W. Wang 87902* (KUN); Mentze, *A. Henry 11338* (K, NY); Wen-shan, *H. T. Tsai*

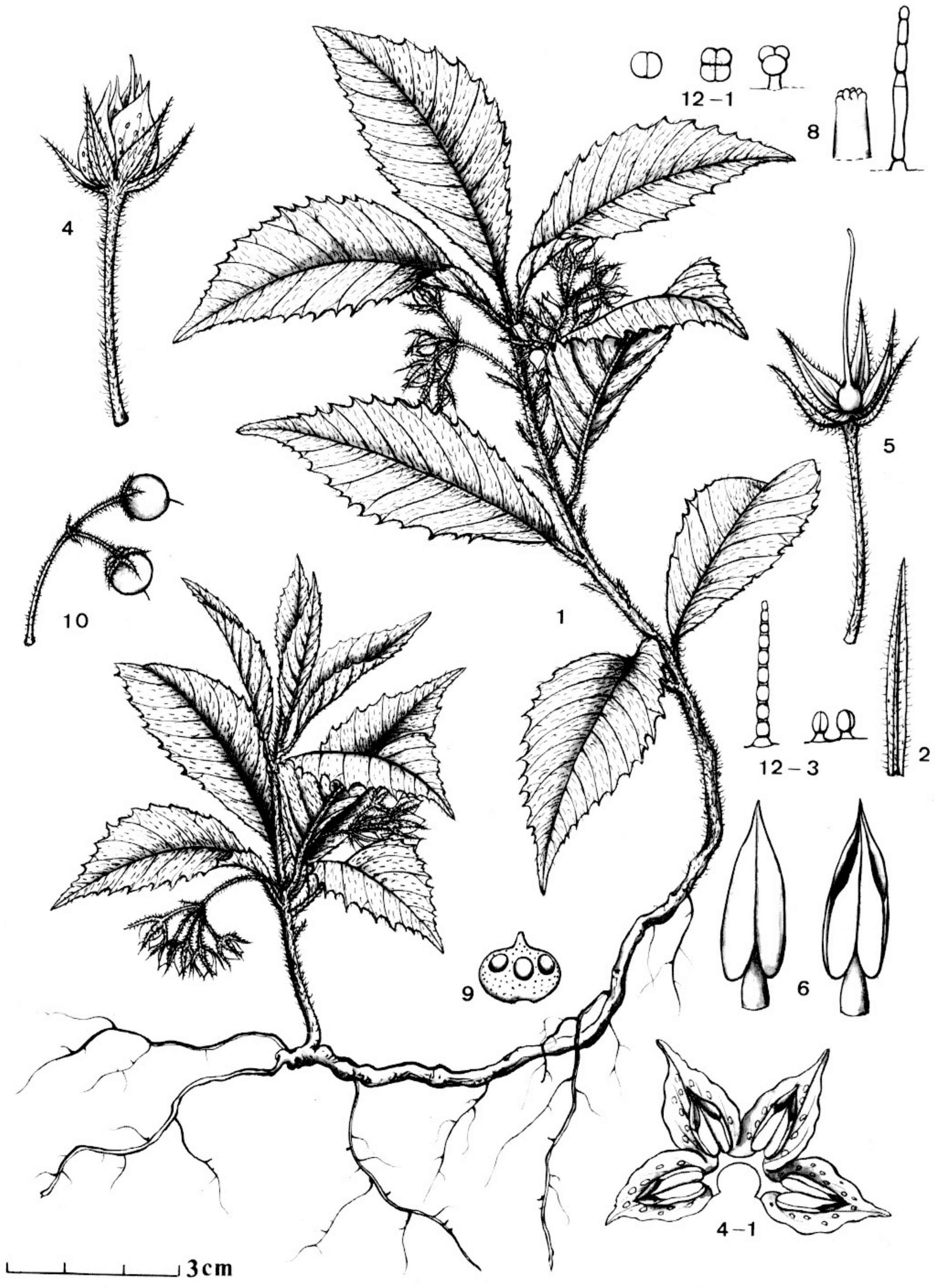

Fig. 31. *Ardisia faberi* (*Wilson 1992*). 1. Habit; 2. Hypsophylls; 4. Flower; 4-1. Petals and stamens; 5. Pedicel with calyx and a pistil; 6. Stamens; 8. Stigma; 9. Ovules on a placenta; 10. Fruit; 12-1. Round-capitate hairs; 12-3. Uniseriate hairs.

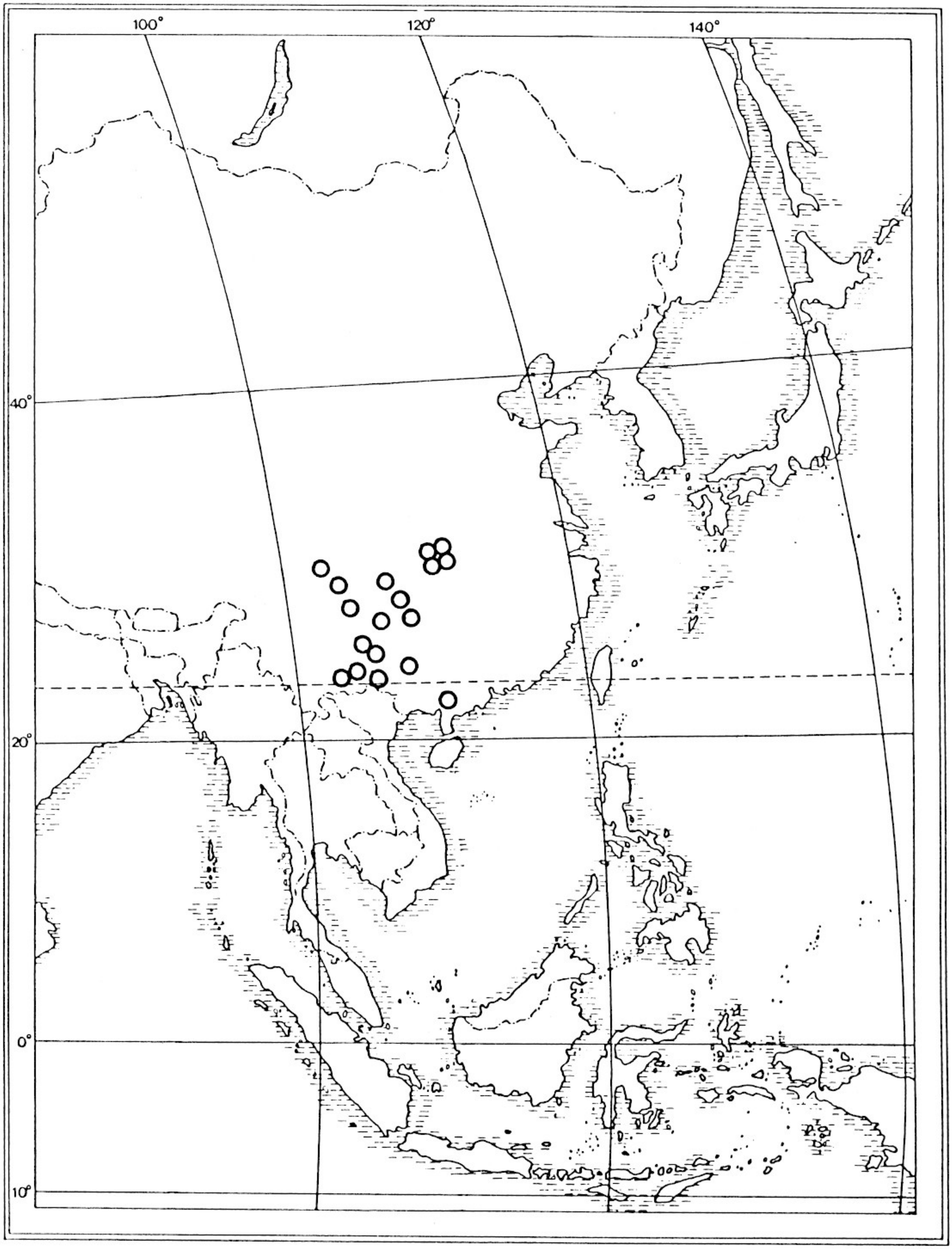

Fig. 32. Distribution of *Ardisia faberi*.

51763 (A); no further locality, *J. Cavalerie 3199* (E, K). No further locality: *Esquirol 3244* (E), *E. E. Maire s. n.* in 1913 (E, in part).

Note. This taxon is closely related to *Ardisia pusilla* A. DC. For further information, see the discussion following *A. pusilla.*

Since Chen's variety *oblanceifolia* is a variable form of this species, and is here treated as a synonym under this binomial.

3. **Ardisia maclurei** Merrill in Philipp. Journ. Sci. Bot. **21**: 351. 1922; Walker in Philipp. Journ. Sci. Bot. **73**: 139. 1940. & in Quart. Journ. Taiwan Mus. **12**: 184. f. 16. 1959; H. L. Li, Woody Fl. Taiwan 714. 1963; Anonymous, Fl. Hainanica **3**: 174. 1974; H. L. Li in Li *et al.*, Fl. Taiwan **3**: 53. 1978; C. Chen in Agend. Academ. Sinic., Fl. Reipubl. Popul. Sinic. **58**: 89. 1979.

Ardisia sciophila Suzuki-Tokio in Journ. Jap. Bot. **13**: 507. f. 1, 2. 1937.

Bladhia sciophila (Suzuki-Tokio) Nakai in Nakai & Honda, Nov. Fl. Jap. **9**: 42. 1943. **Fig. 33**

A small shrub with a creeping rhizome, ca. 4–15 cm high, pubescent with uniseriate and short round-capitate hairs on both young vegetative parts and inflorescences; stems ascending, densely villose when young, nearly glabrous when mature; hypsophylls membranous, linear-oblanceolate, 4–8 mm long, villose beneath, puberulous above, punctate, the midvein prominent, raised beneath, the lateral veins 1–3 pairs; leaves alternate or subverticillate, chartaceous, oblong-ovate or ovate or oblong-elliptic, 2.5–6 cm long 1.5–4 cm wide, acute or obtuse at the apex, conspicuously cordate at the base, irregularly dentate, pilose on both surfaces, especially on midrib, the midrib raised beneath, the lateral veins 6–14 pairs; petioles 0.5–1 cm long, densely pilose. Inflorescences subumbellate or rarely racemose, axillary from hypsophylls or rarely normal leaves; peduncle 1.3–4.1 cm long, pilose; bracteoles membranous, linear-lanceolate or linear-elliptic, 3–5 mm long, villose beneath, puberulous above, minutely punctate; pedicels 3–7 mm long, pilose; sepals united at the base, the lobes narrowly lanceolate, 3–4 mm long, glabrous above, pilose beneath, ciliate, minutely punctate toward the apex; corolla-lobes light purple or red, ovate, acute at the apex, ca. 4 mm long, punctate at the apex; filaments very short, glabrous; anthers ovate, cordate at the base; ovary globular-ellipsoid, glabrous; ovules ca. 5 in a whorl. Fruit globose, glabrous, ca. 6 mm in diameter, dark red.

Typification. *Ardisia maclurei* is typified by *MaClure 8668* (UC, holotype; A, isotype) collected at Ng Chi Ling, Hainan, China, on December 15, 1921.

Distribution. Vietnam, South China, and Taiwan. (Fig. 34).

Ecology. The collections were made at shady sites, near streams, or in dense forests, at 230 to 860 meters. Flowering specimens were gathered from April to May. Fruiting specimens were collected throughout the year.

Additional specimens examined. **VIETNAM.** Tonkin: no further locality, *Petelot 1692* (UC). **CHINA.** Hainan: Poting, *F. C. How 72049* (A); Loktung, *Lau 27353* (A, US); Wuchihling, *F. A. MaClure s. n.* in 1922 (NA, US), *et* in 1922 (A, NA, US); no further locality, *C. Wang 36036* (NY). Kwangsi: Yaoshan, *C. Wang 40693* (A). Kwangtung: Kunghu, *K. L. Shih 13460* (WUK); Tingwu Shan, *K. C. Ting et K. L. Shih 747* (L). Taiwan: Taipei, *T. Suzuki 14926* (TAI), *15547* (TAI), *15634* (TAI), *et 16126* (TAI).

Note. This species is apparently different from all other known species in having leaves cordate at the base. The shape of the leaves is somewhat pandurate.

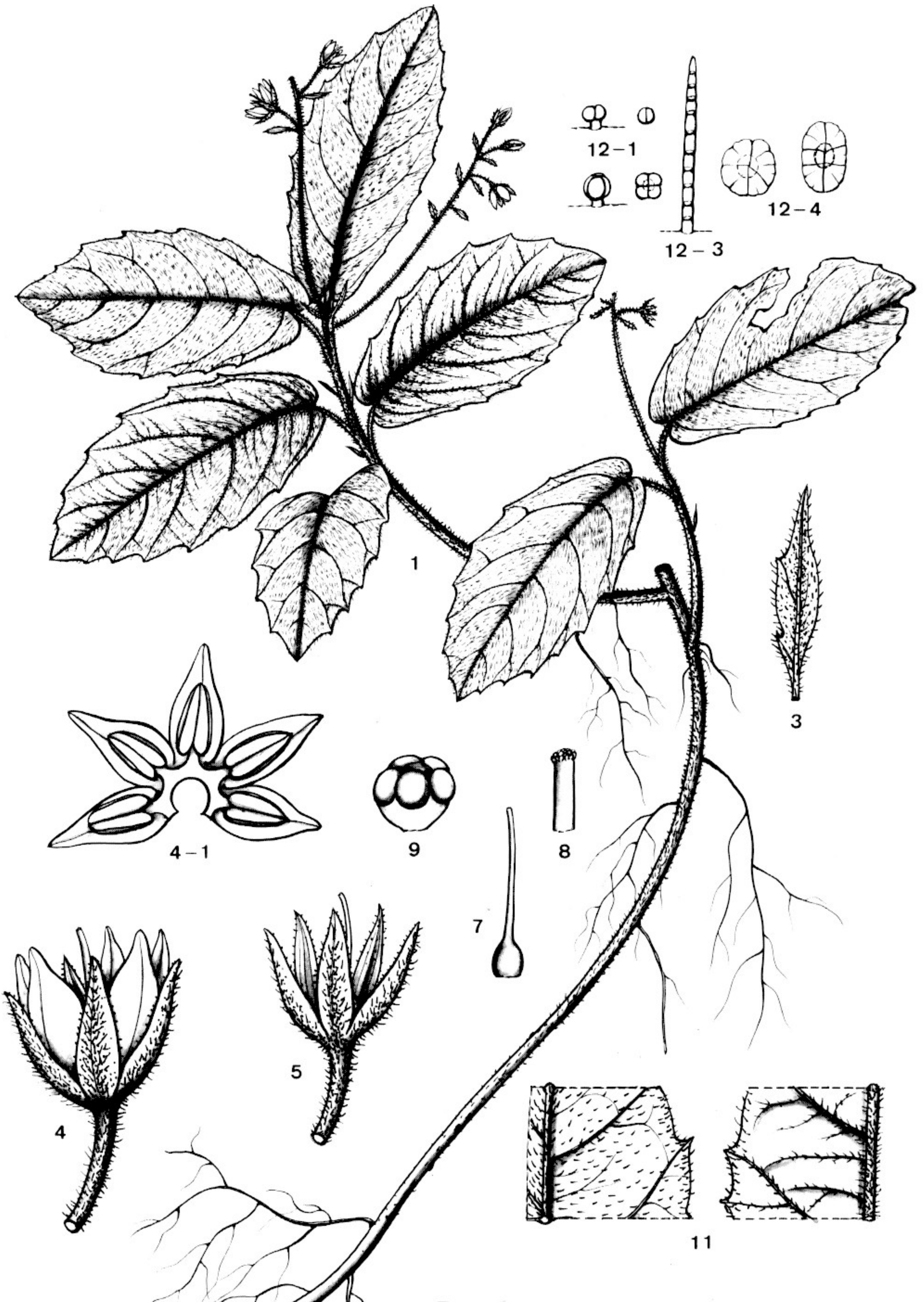

Fig. 33. *Ardisia maclurei* (CCC. no. *9552*) 1. Habit; 3. Bracteole; 4. Flowers; 4-1. Petals and stamens; 5. Calyx; 7. Pistil; 8. Stigma; 9. Ovules on a placenta; 11. Magnified part of leaf margin; 12-1. Round-capitate hairs; 12-3. Uniseriate hairs; 12-4. Round-peltate scales.

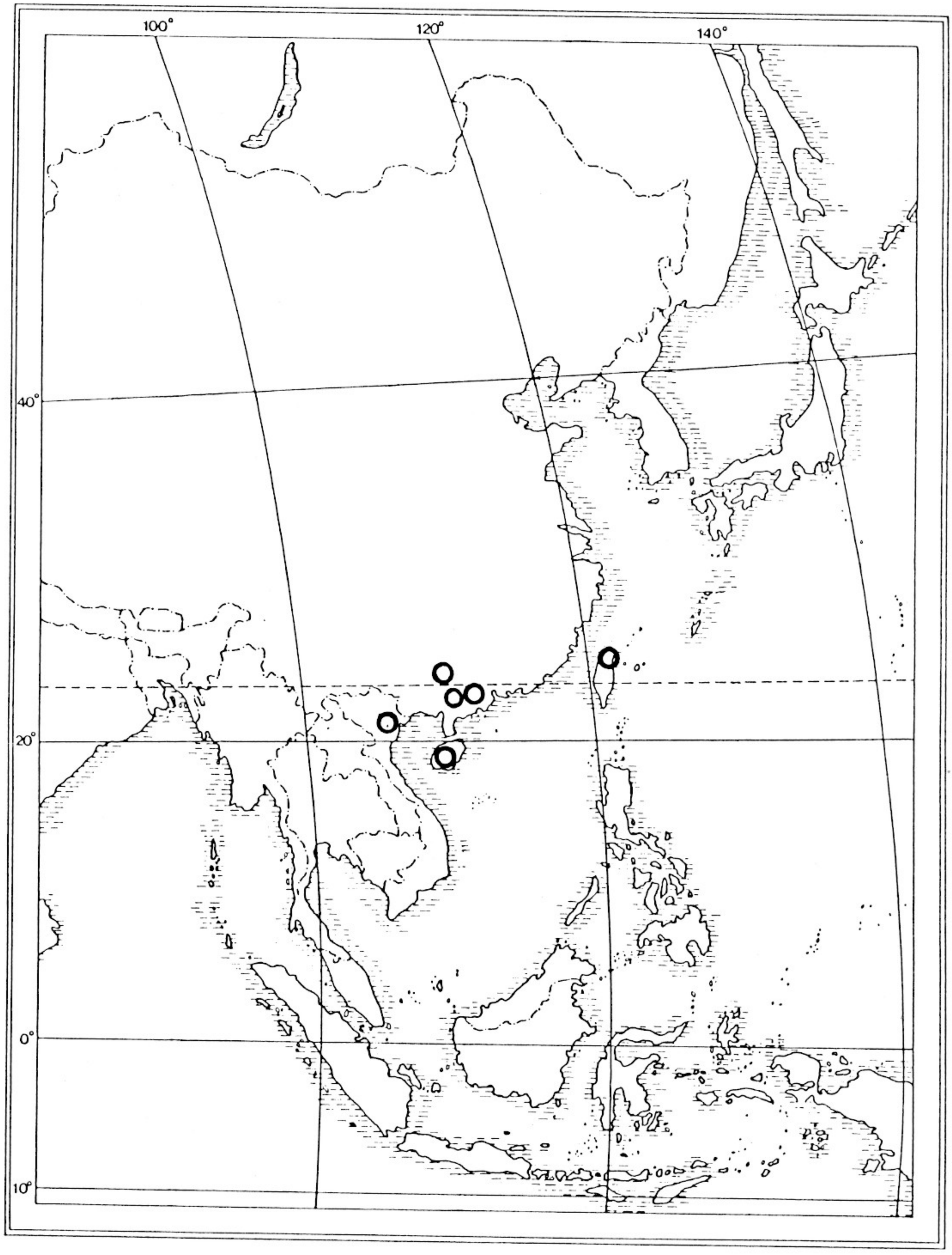

Fig. 34. Distribution of *Ardisia maclurei*.

It is difficult to indicate its allied species on the basis of foliage characters. However, *A. maclurei* is closely related to *A. faberi* Hemsley rather than to *A. pusilla* A. DC. since the former has long triangular calyx-lobes, larger uniseriate hairs, and a rather stout peduncle of the inflorescences.

4. **Ardisia pusilla** A. DC. in Trans. Linn. Soc. **17**: 126. 1834 & in Ann. Sci. Nat. 2. Ser. II, 297. 1834; G. Don, Gen. Hist. Dichl. Pl. IV, 18. 1838; A. DC. in DC., Prodr. 8: 137. 1844; Miquel in Ann. Mus. Bot. Lugd. Bat. **2**(2): 263. 1866, & Prol. Fl. Jap. 151. 1866; Forbes & Hemsley in Journ. Linn. Soc. **26**: 266. 1889; Walker in Philipp. Journ. Sci. Bot. **73**: 132. 1940 & in Quart. Journ. Taiwan Mus. **12**: 183. fig. 15. 1959; H. L. Li, Woody Fl. Taiwan 713. 1963; J. Ohwi, Fl. Jap. (English ed.) 714. 1965; S. Hatusima, Fl. Ryukyus 466. 1971; H. L. Li in Li *et al.*, Fl. Taiwan **4**: 53. 1978; C. Chen in Agend. Academ. Sinic., Fl. Reipubl. Popul. Sinic. **58**: 88. 1979.

Bladhia villosa Thunb., Fl. Jap. 96. fig. 19. 1784; Nakai in Nakai & Honda, Nov. Fl. Jap. **9**: 46. 1943.
Ardisia villosa (Thunb.) Mez in Pflanzenr. 9(IV. 236): 152. 1902; non Roxb.
Bladhia villosa Thunb. var. *liukiuensis* Nakai in Bot. Mag. Tokyo **35**: (99). 1921, Trees & Shrubs Jap. **1**: 206. 1922, & in Tokyo Bot. Mag. **38**: 42. 1924.
Ardisia villosa (Thunb.) Mez var. *liukiuensis* (Nakai) Makino & Nemoto, Nippon Shokubutsu Soran (Fl. Jap.) ed. 1. 395. 1925.
Ardisia pusilla A. DC. var. *liukiuensis* (Nakai) Okuyama *ex* Takamine, Fl. Yaeyama-gunto. 82. 1952.
Bladhia villosa Thunb. var. *reptans* (Merr.) Nakai in Nakai & Honda, Nov. Fl. Jap. **9**: 47. 1943.
Ardisia pusilla A. DC. form. *liukiuensis* (Nakai) Ohwi, Fl. Jap. 913. 1953.
Ardisia pusilla A. DC. form. *reptans* (Merr.) Ohwi, Fl. Jap. 913. 1953.
Bladhia villosa Thunb. var. *typica* Nakai in Nakai & Honda, Nov. Fl. Jap. **9**: 46. 1943.
Bladhia villosa Thunb. var. *reptans* form. *albo-variegata* Nakai in Nakai & Honda, Nov. Fl. Jap. **9**: 47. 1943.
Bladhia villosa Thunb. var. *reptans* form. *albido-variegata* Nakai in Nakai & Honda, Nov. Fl. Jap **9**: 47. 1943.
Bladhia villosa Thunb. var. *reptans* form. *aureopicta* Nakai in Nakai & Honda, Nov. Fl. Jap. **9**: 48. 1943.
Bladhia villosa Thunb. var. *reptans* form. *viridi-marginata* Nakai in Nakai & Honda, Nov. Fl. Jap. **9**: 48. 1943.
Bladhia villosa Thunb. var. *reptans* form. *aureo-variegata* Nakai in Nakai & Honda, Nov. Fl. Jap. **9**: 48. 1943.
Bladhia villosa Thunb. var. *reptans* form. *obscure-variegata* Nakai in Nakai & Honda, Nov. Fl. Jap. **9**: 48. 1943.
Bladhia villosa Thunb. var. *typica* Nakai in Nakai & Honda, Nov. Fl. Jap. **9**: 46. 1943.
Bladhia villosa Thunb. var. *typica* form. *violascens* Nakai in Nakai & Honda, Nov. Fl. Jap. **9**: 47. 1943.
Ardisia reptans Merrill in Phipp. Journ. Sci. Bot. **5**: 220. 1910 (Based on Foxworthy in Philipp. Bur. Sci. Herb. *no. 1933.* not seen).
Ardisia reptans Mez in Rep. Nov. Sp. **16**: 415. 1919. (Based on Foxworthy in Philipp. Bur. Sci. Herb. *no. 1933.* not seen). **Fig. 35**

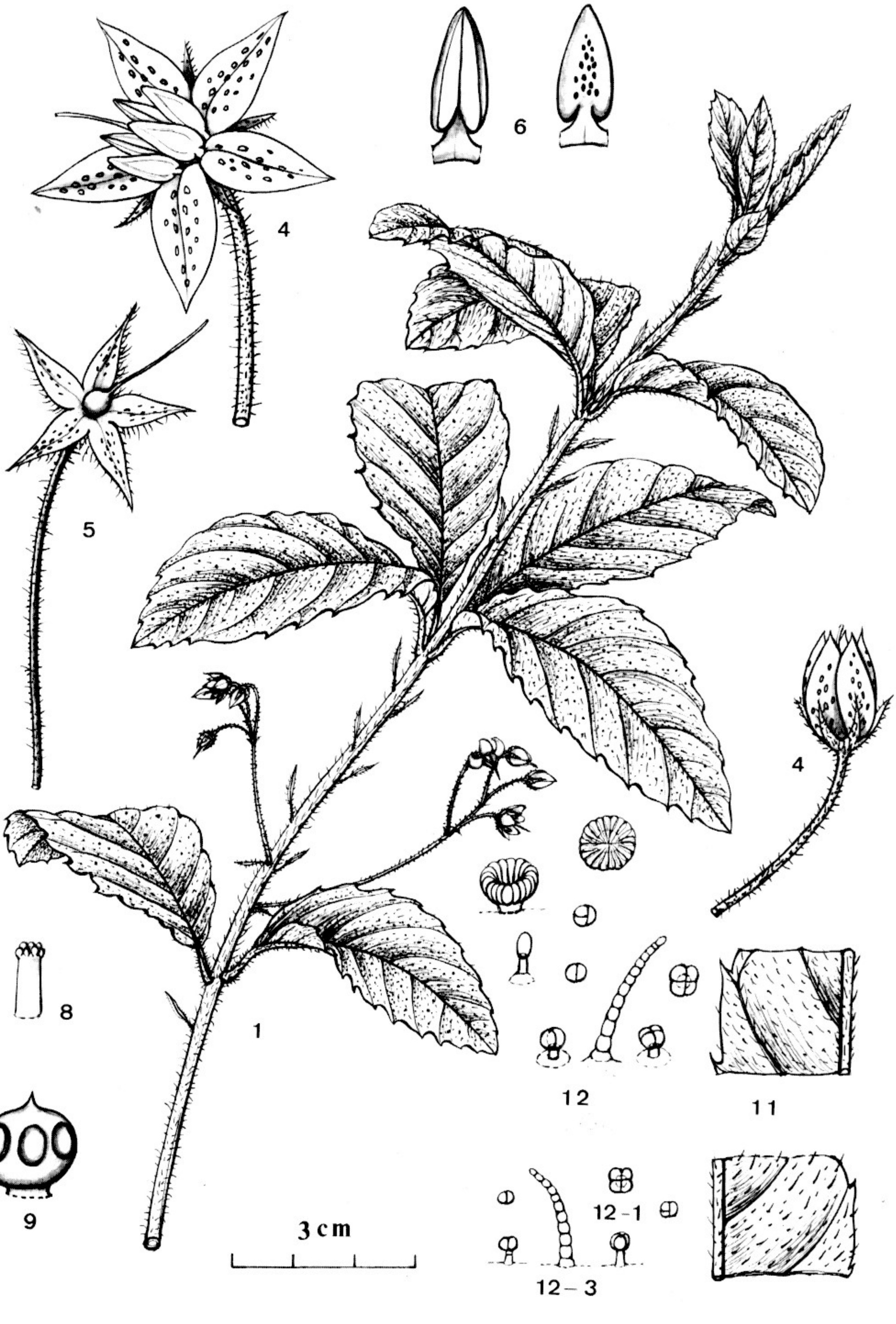

Fig. 35. *Ardisia pusilla* (*Lu s. n.* May, 1985). 1. Habit; 4. Flower; 5. Pedicel with calyx and a pistil; 6. Stamens; 8. Stigma; 9. Ovules on a placenta; 11. Magnified part of a leaf; 12. Trichomes; 12-1. Round-capitate hairs; 12-3. Uniseraite hairs.

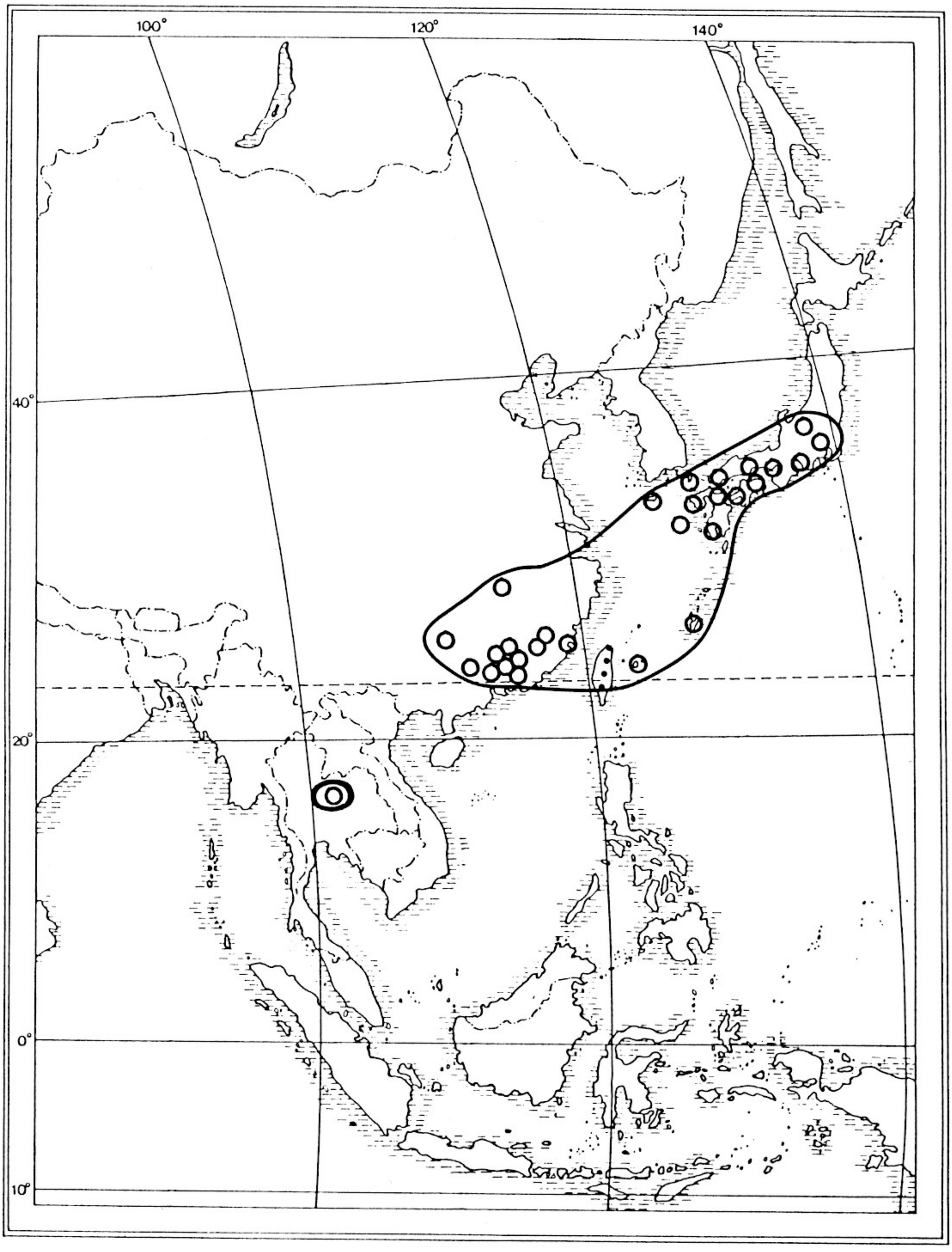

Fig. 36. Distribution of *Ardisia pusilla*.

A small shrub about 30 cm high, with a creeping rhizome, pubescent with uniseriate and short round-capitate hairs on both young vegetative parts and short round-capitate hairs on both young vegetative parts and inflorescences; stems ascendent, densely fuscous-villose with long uniseriate hairs when young, glabrate when mature; hypsophylls narrowly lanceolate, 0.4–0.8 cm long, villose with long and short uniseriate hairs beneath and with short uniseriate hair above, sparsely punctate at upper part, the midvein raised beneath; leaves opposite or subverticillate, chartaceous, elliptic or elliptic-ovate or obovate, 1.4–6.8 cm long, 0.7–4.7 cm wide, obtuse or broadly acute at the apex, rounded or acute at the base, serrate or distantly serrate or denticulate, glabrate or glabrous above, fuscous-pubescent with long and short uniseriate hairs beneath, somewhat minutely punctate, the midrib raised beneath, the lateral veins 5–8 pairs; petioles 0.2–0.9 cm, villose. Inflorescences subumbellate or umbellate, axillary from hypsophylls; peduncle 1.4–4.1 cm long, somewhat slender, villose with long and short uniseriate hairs; pedicels 0.4–1.1 cm long, slender, villose; sepals united near the base, the lobes lanceolate-subulate, acuminate, pilose beneath, glabrous above, punctate along the midvein; corolla-lobes white or pink, 3–5 mm long, ovate or broadly ovate, acute at the apex, punctate; filaments short, glabrous; anthers ovate, sagittate at the base, somewhat or not punctate; ovary globose, glabrous; style slender, glabrous; ovules 6–7 in a whorl. Fruit globose, red, 0.4–0.8 cm in diameter, glabrous.

Typification. A photo of a specimen at the Thunbergian Herbarium was examined. The herbarium number of this specimen is *5578*. The specimen on the right of the sheet almost matches Thunberg's drawing in the Flora of Japan (1784). I hereby designate the sheet with number *5578* as the loctotype of this species.

Distribution. Thailand, the Philippines, China, Taiwan, the Ryukyus, Japan, and Korea. (Fig. 36).

Ecology. This species occurs in shady forests or on moist, shady stony banks by streams. Most flowering collections were made from April to August, the fruiting ones from July to December.

Additional specimens examined. **THAILAND.** Chaiyaphum, *R. Geesink et al. no. 103* (MO). **CHINA.** Fukien: Hinghwa, *H.H. Chung 939* (K, UC); Kushan, *H.H. Chung 7595* (A); Minhow, *H.H. Chung 2312* (K, UC); no further locality, *H.H. Chung 909* (E, UC), *Dunn s.n.* in 1905 (A). Kwangtung: Chenyang, *L. Teng 1644* (KUN); Hoping, *J.F. Wei 120302* (KUN); Kochow, *P.K. To s.n.* in 1919 (E, NY, US); Lungmen, *Hance 10622* (BM); Lung-tau-shan, *To et Tsang 12158* (A, BM, MO, NA, NY, UC, US); Yao-shan, *S.S. Sin 11900* (A, NY); Shan-yuei-shan, *W.T. Tsang 23366* (A, US); Wung-yuan, *S.K. Lau 911* (A, NY), *927* (A, NY), *25182* (TAI); no further locality, *C.O. Levine s.n.* in 1917 (US), *F.A. MaClure 00518* (NY). Kwangsi: Lushan, *Y.K. Hsiung 6289* (A); Huachiang, *Kwangsituei 1152* (KUN). Taiwan: Hsinchu, Sasaki *s.n.* in 1916 (TAIF), *T. Suzuki 4681* (TAI); Hualien, *Chiou et Lin s.n.* in 1983 (TAIF), *T. Shimizu et M.T. Kao s.n.* in 1961 (TAI); Ilan, *Mori s.n.* in 1909 (TAIF); Taichung, *Lu 15440* (TAIF), *Sasaki, s.n.* in 1922 (TAIF), *Lu 14239* (TAIF); Taipei, *Lu 12383* (TAIF), *16241* (TAIF). **THE RYUKYUS**: Benoki-yama, *E.H. Walker et al. 7104* (E); Hanechiyama, *Nagahara 183*; Iriomote Isl., *N. Fukuyama s.n.* in 1938 (TAI), *M. Furuse 1179* (US), *Masamune 1906* (TAI), *T. Yamazaki 384* (TI); Okinawa, *M. Furuse 1735* (US); Kunigami, *T. Suzuki 16403* (TAI), *Walker et al. 6223* (E, G), *6969* (E, K, G, UC); Okinawa-shima, *T. Amano 6867* (A); Yaeyama

Isl., *M. Furuse 2253* (K). **JAPAN.** Honshu: Hiroshima, *J. Shiraga s.n.* in 1909 (TAIF); Shizuoka (Iwata gun), *G. Murata 38845* (TI); Yamaguchi (Kamai), *K. Oka 36997* (A, TI); Wakayama, *K. Shiota 3221 et 5365* (A), *M. Tagashi 7201* (BM, E, K, NY, UC), *K. Uno 1606* (NY). Kyushu: Asamaya Isl., Anonymous *s.n.* in 1909 (E); Buzen (Beppu), *K. Sakurai s.n.* in 1905 (A); Buzen (Iwatame), Anonymous *s.n.* in 1908 (E); Hondo (Chiba), *M. Furuse s.n.* in 1958 (A); Kagoshima (Hamaragun), *K. Tukasa s.n.* in 1940 (TAI); Miyazaki (Minaminaka gun), *M. Togashi et al. s.n.* in 1965 (TI); Murozumi (Suo), *H. Migo s.n.* in 1951 (UC); Nagasaki, *F. Maekawa s.n.* in 1946 (US), *Maximowicz s.n.* in 1863 (BM, GA, K, US), *F.G. Meyer et al. 17258* (NA), *H. Ohashi et H. Ohba 238* (A), *R. Oldham 496* (GA, K, NY); Kochi (Tosa), Anonymous *s.n.* in 1888 (GA); Osumi (Isls. Tokara), *S. Sako 7304* (TI); Satuma, *Shiraga s.n.* in 1909 (TAIF), *G. Masamune s.n.* in 1923 (NY), *T. Suzuki s.n.* in 1930 (TAI); Totomi, *M. Togashi s.n.* in 1969 (TI); Yaku Isl., Y. *Kudo s.n.* in 1907 (TAI); Yakushima, *E.H. Wilson 6408* (A, K), *J.L. Creech 689* (A, US); no further locality, *E.H. Wilson s.n.* in 1917 (A). **KOREA.** Quelpaert, *U. Faurie 737* (E), *1897* (A, E), *Taquet 1093* (E, K, UC), *4307* (E), *4470* (UC), *9791* (E); Seiki-ho, *E.H. Wilson 9545* (A).

Note. This is a rather complex species as reflected in the variability of leaf size. A robust form, *Ardisia pusilla* form. *liukiuensis* (Nakai) Ohwi, has the largest leaves measuring up to 6.8 cm long by 4.7 cm wide. Despite foliar variability, the following characters are consistent for the species and readily distinguish it from its close ally, *Ardisia faberi* Hemsley: the obvious ratio of peduncle length to that of pedicel in an inflorescence (mostly 2–2.5 to 1), cuneate or obtuse base and obtusely acute apex of leaves, and shorter and 1-veined calyx-lobes.

5. **Ardisia walkerii** Yang, *nom. nov.*

Ardisia japonica (Hornst.) Blume var. *montana* Miq. in Ann. Mus. Bot. Lugd. Bat. **2**: 263. 1866, **3**: 190. 1867, & in Prol. Fl. Jap. **1**: 191. 1866; Makino & Nemoto, Fl. Jap. 394. 1925, ed. 2. 900. 1931; Walker in Philipp. Journ. Sci. Bot. **73**; 148. 1940.

Ardisia montana Sieb. *ex* Miq. in Ann. Mus. Bot. Lugd. Bat. **2**: 263. 1866. pro. syn.; Franchet & Savatier, Enum. Pl. Jap. **1**: 305. 1875; S. Hatusima, Fl. Ryukyus 466. 1971.

Bladhia japonica Hornst. var. *montana* Nakai in Nemoto, Suppl. Fl. Jap. 569. 1936.

Tinus montana (Miq.) Kuntze, Rev. Gen. Pl. **2**: 974. 1891.

Bladhia montana (Miq.) Nakai, Trees & Shrubs Jap. **1**: 203. fig. 117. 1922, & in Nakai & Honda, Nov. Fl. Jap. **9**: 43. 1943.

Bladhia montana (Miq.) form. *punctata* Nakai in Nakai & Honda, Nov. Fl. Jap. **9**: 43. 1943.

Ardisia montana (Miq.) Walker in Bot. Mag. Tokyo **67**: 206. 1954.

Ardisia montana (Miq.) Sieb. *ex* Franchet & Savatier *ex* Ohwi, Fl. Jap. 912. 1953.

Fig. 37

A small shrub up to 30 cm high with a creeping rhizome, pubescent with uniseriate and short round-capitate hairs on both young vegetative parts and inflorescences; stems unbranched, with uniseriate and short round-capitate hairs when young, glabrous when mature; hypsophylls lanceolate, 4–5 mm long, 1–1.5 mm wide, acuminate or acute at the apex, glabrate with short round-capitate hairs on both surfaces, minutely ciliate; leaves subcoriaceous, in a few whorls on upper

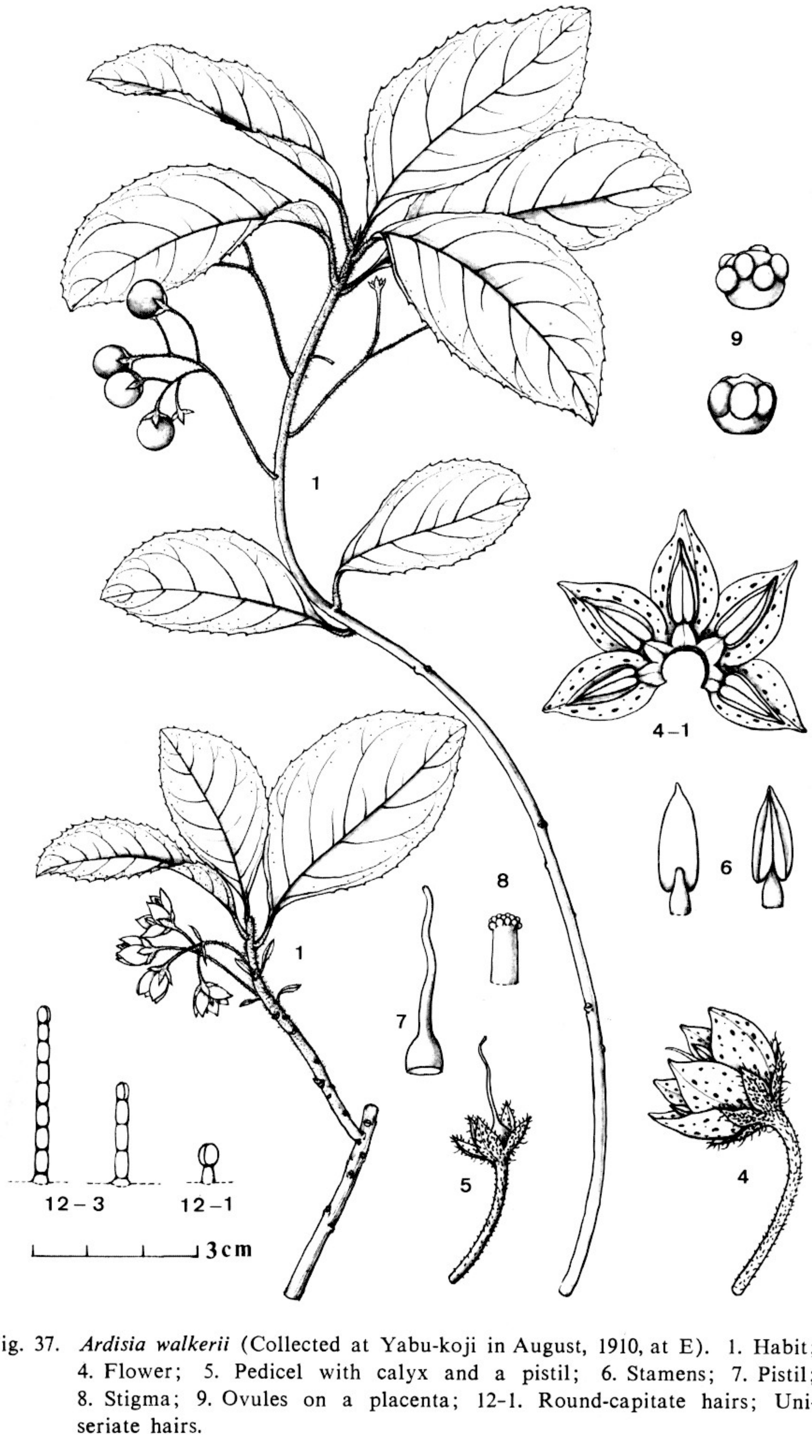

Fig. 37. *Ardisia walkerii* (Collected at Yabu-koji in August, 1910, at E). 1. Habit; 4. Flower; 5. Pedicel with calyx and a pistil; 6. Stamens; 7. Pistil; 8. Stigma; 9. Ovules on a placenta; 12-1. Round-capitate hairs; Uniseriate hairs.

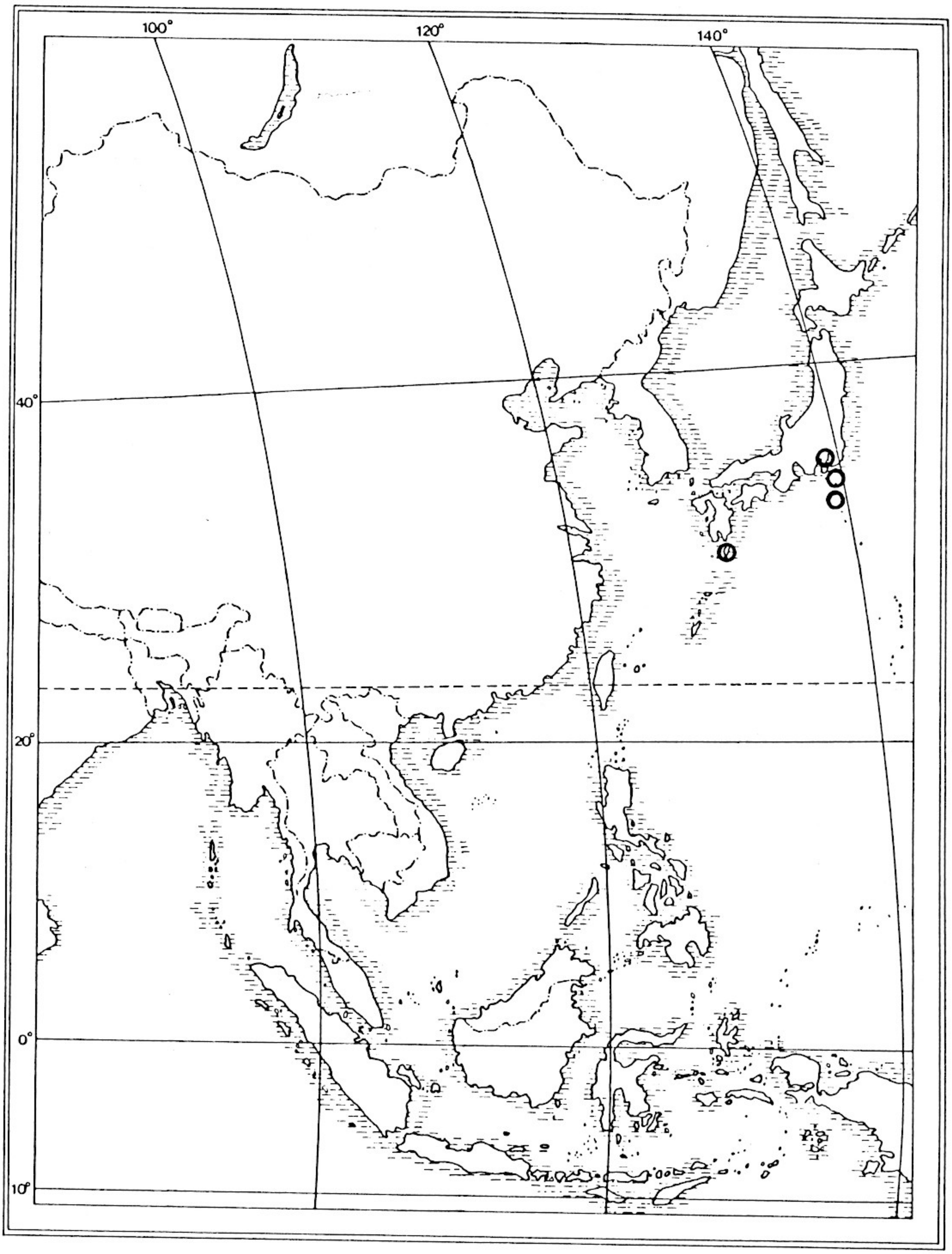

Fig. 38. Distribution of *Ardisia walkerii*.

part of stems, usually 3 in a whorl, obovate-oblong to oblong, 3.5–13 cm long, 2–4 cm wide, acute or obtuse, the teeth slightly apiculate, with sparse uniseriate hairs on both surfaces when young, the lateral veins 5–8 pairs, slightly raised on both surfaces, the midrib slightly canaliculate above and raised beneath, pubescent with uniseriate hairs; petioles 3–15 mm long, with dense uniseriate hairs. Inflorescences umbellate or umbellate-paniculate, 2–6-flowered, axillary from hypsophylls; peduncle 1.5–2.5 cm long, stout or slender, with uniseriate hairs; bracteoles lanceolate, ca. 3 mm long, 1-veind, with uniseriate hairs on midvein beneath; pedicels 7–12 mm long, with minute short round-capitate hairs; sepals united near the base, the lobes triangular or triangular-ovate, 1-veined, acute, minutely ciliate, punctate along the midvein; corolla-lobes ovate, white, acuminate, punctate with red dots; filaments short, ca. 2 mm long; anthers ovate, ca. 4 mm long, acute at the apex, sagittate at the base; ovary subglobose, punctate; ovules 6–8 in 1 or rarely 2 whorls. Fruit red, 5–7 mm in diameter, globose,

Typification. In 1866, Miquel published *Ardisia japonica* var. *montana*, based on Pierot's collection from Japan, for this taxon. On the same specimen, Siebold wrote another name *Ardisia montana*; this was never validly published. Under the binomial given by Miquel, *Ardisia montana* was listed and regarded as a synonym (in Ann. Mus. Bot. Lugd. Bat. 2: 263. 1866). Until 1954, Walker followed some authors' treatments, retaining its specific rank and formally publishing it as *Ardisia montana* (Miq.) Walker. However, it became a later homonym as the binomial, *Ardisia montana*, had been applied to another species by King and Gamble in 1902. According to Article 64 of the International Code of Botanical Nomenclature, a new name is therefore proposed, *Ardisia walkerii* Yang. The specific epithet is in honor of Egbert H. Walker for his contribution to the Myrsinaceae of Eastern Asia in the past years. The type specimen of *Ardisia japonica* (Hornst.) Bl. var. *montana* Miq. is accordingly the type of this new name. It is now deposited at the Rijksherbarium at Leiden, Netherland.

Distribution. Japan. (Fig. 38).

Ecology. Plants grow in forests and flower in May through August.

Additional specimens examined. Only one specimen from the Herbarium Edinburgh was examined. It was collected at Yabu-koji, Japan, in August, 1910, but no collector's name was given.

Note. Several writers, Nakai (1943), Walker (1954) and Ohwi (1965), noting the characters intermediate between *A. japonica* (Hornst.) Bl. and *A. pusilla* A. DC., suggested that the taxon is a natural hybrid. Pending the aquisition of fresh material for hybridity experimentation, the problem has been set aside momentarily.

Sect. 2. **Ardisia** subgenus **Bladhia** sect. **Odontophylla** Yang, *sect. nov.*

Type syecies. *Ardisia odontophylla* Wall. *ex* A. DC.

Description. Folia subverticillata vel cespitosa vel rarissime alterna, serrulata vel fimbriato-serrulata. Inflorescentiae racemosae vel subumbellatae vel umbellato-paniculatae vel paniculatae, axillares ex bracteis vel foliis orientes. Calycis lobi ovati. Ovula 5–13 uniseriatim disposita.

Plants subshrubs or shrubs to 3 m high, with or without a creeping rhizome, pubescent with short round- or elongate-capitate or both kinds of hairs on young stems, petioles, undersurface of leaves, and inflorescences. Hypsophylls present,

deltoid, linear or lanceolate. Inflorescences racemose, subumbellate, subumbellate-racemose, or paniculate, axillary from hypsophylls or leaves; calyx-lobes ovate or triangular-ovate, usually punctate; ovules 5-13 in a whorl.

Note. This section includes nineteen species mainly distributed in Malay Peninsula, Thailand, Vietnam, and Yunnan of China.

Subsect. 1. **Ardisia** sect. **Odontophylla** subsect. **Fimbriata** Yang, *subsect. nov.*

Type species. *Ardisia fimbriata* Fletcher.

Suffrutex pilis brevibus rotundatis praeditus. Petioli non alati. Inflorescentiae subnmbellato-paniculatae. Ovarium glabrum.

Description. A small shrub, pubescent, the hairs short round-capitate; petioles not winged. Inflorescences subumbellate-paniculate; ovary glabrous.

Note. This subsection, composed of two species, is possibly allied to subsection *Odontophylla* as discussed previously.

6. **Ardisia fimbriata** Fletcher. in Kew Bull. **1937**: 30. 1937, & in Kerr, Fl. Siam. Enum. **2**(4): 341. 1938. **Fig. 39**

A shrub ca. 2 m high, sparsely pubescent with short round-capitate hairs on young vegetative parts and inflorescences, soon glabrous; hypsophylls unknown; leaves subverticillate, chartaceous, oblong-elliptic, 10–25 cm long, 3–8 cm wide, acuminate or attenuate at the apex, attenuate at the base, finely fimbriate-serrulate, olivaceous-green above, grey beneath, glabrous on both sides, the midrib slightly canaliculate above, conspicuously raised beneath, the lateral veins 20–30 pairs, slightly raised above when dry, raised beneath; petioles 1.5–3 cm long, obviously canaliculate above. Inflorescences subumbellate or subumbellate-paniculate, axillary from hypsophylls or rarely leaves, pendulous, ca. 10 cm long; peduncle 4–8 cm long, nearly glabrous; bracteoles linear-oblanceolate, ca. 3 mm long, slightly puberulous, black-punctate, the midvein conspicuously raised beneath; pedicels 5–10 mm long, slightly puberulous; sepals united 1/4–1/5 their length, the lobes ovate, ca. 1 mm long, 0.8 mm wide, glabrous, irregularly undulate at margin, black-punctate along midvein; corolla-lobes white, ovate, ca. 4 mm long, 3 mm wide, obtuse at the apex, punctate; stamens 2.5 mm long; anthers ovate, punctate on the back; ovary subglobose, glabrous; ovules ca. 5 in a whorl, borne on the upper portion of the placenta. Fruit unknown.

Typification. The original description was based on *Kerr 10374* collected at Kao-hi-yai, Kanburi, Siam (Thailand), in 1926. No holotype was designated. Only two syntypes were examined in this study. The syntype deposited at Royal Botanical Garden, Edinburgh, is here designated as the lectotype for this species since it has several peduncles and some flowers. The other, at British Museum (Natural History), is accordingly the isolectotype.

Distribution. Siam (Thailand). (Fig. 40).

Ecology. The specimens were collected in evergreen forests at about 1400 meters.

Note. Apart from the type collections, no other specimens were available for examination.

This species is apparently close to *Ardisia theaefolia* King & Gamble resembling it in having the inflorescences paniculate and the leaves with similar punctations; it differs however, in the leaves being subverticillate with more pairs of lateral veins.

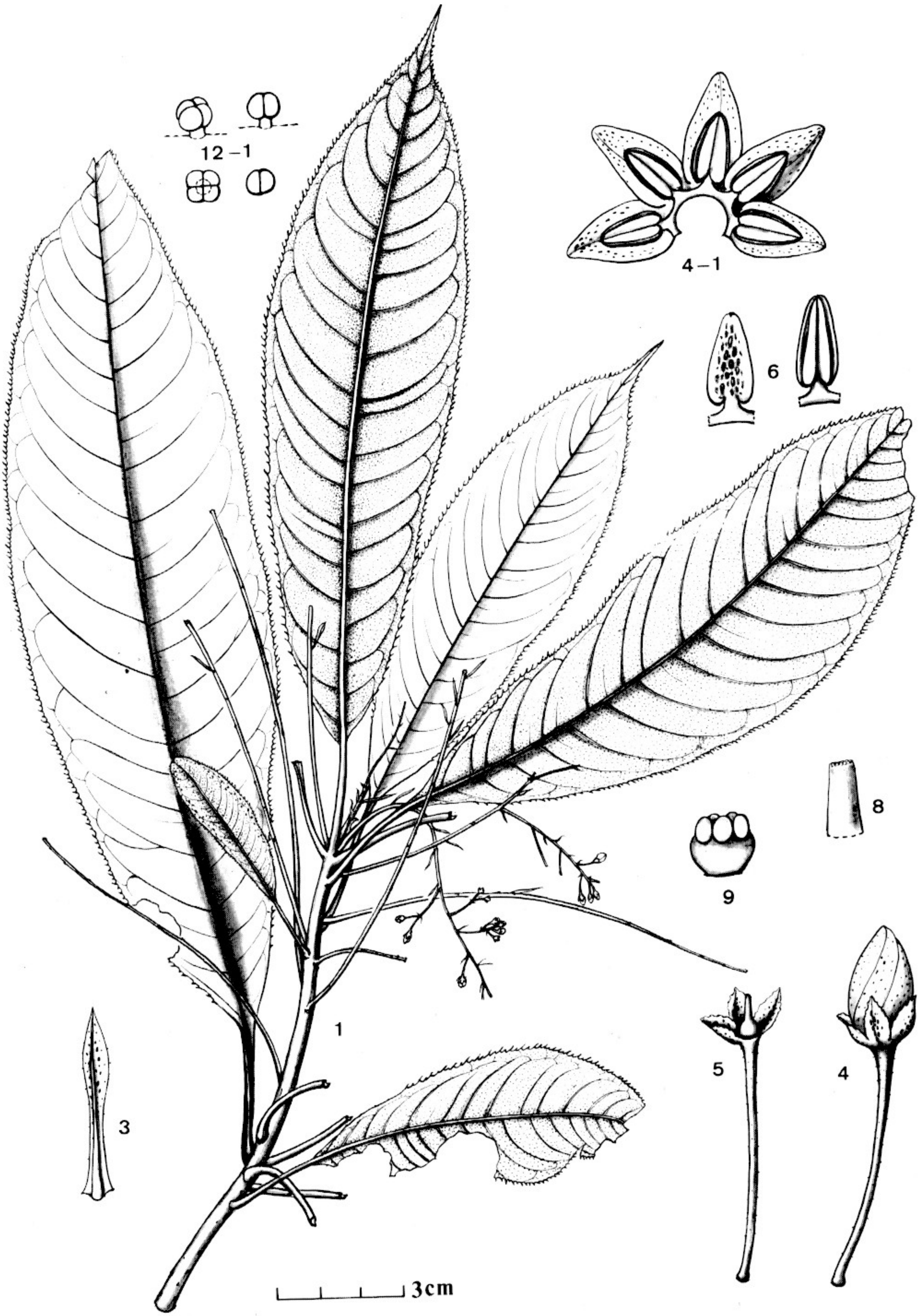

Fig. 39. *Ardisia fimbriata* (*Kerr 10374*). 1. Habit; 2. Bracteole; 4. Floral bud; 4–1. Petals and stamens; 5. Pedicel with calyx and a pistil; 8. Stigma; 9. Ovules on a placenta.

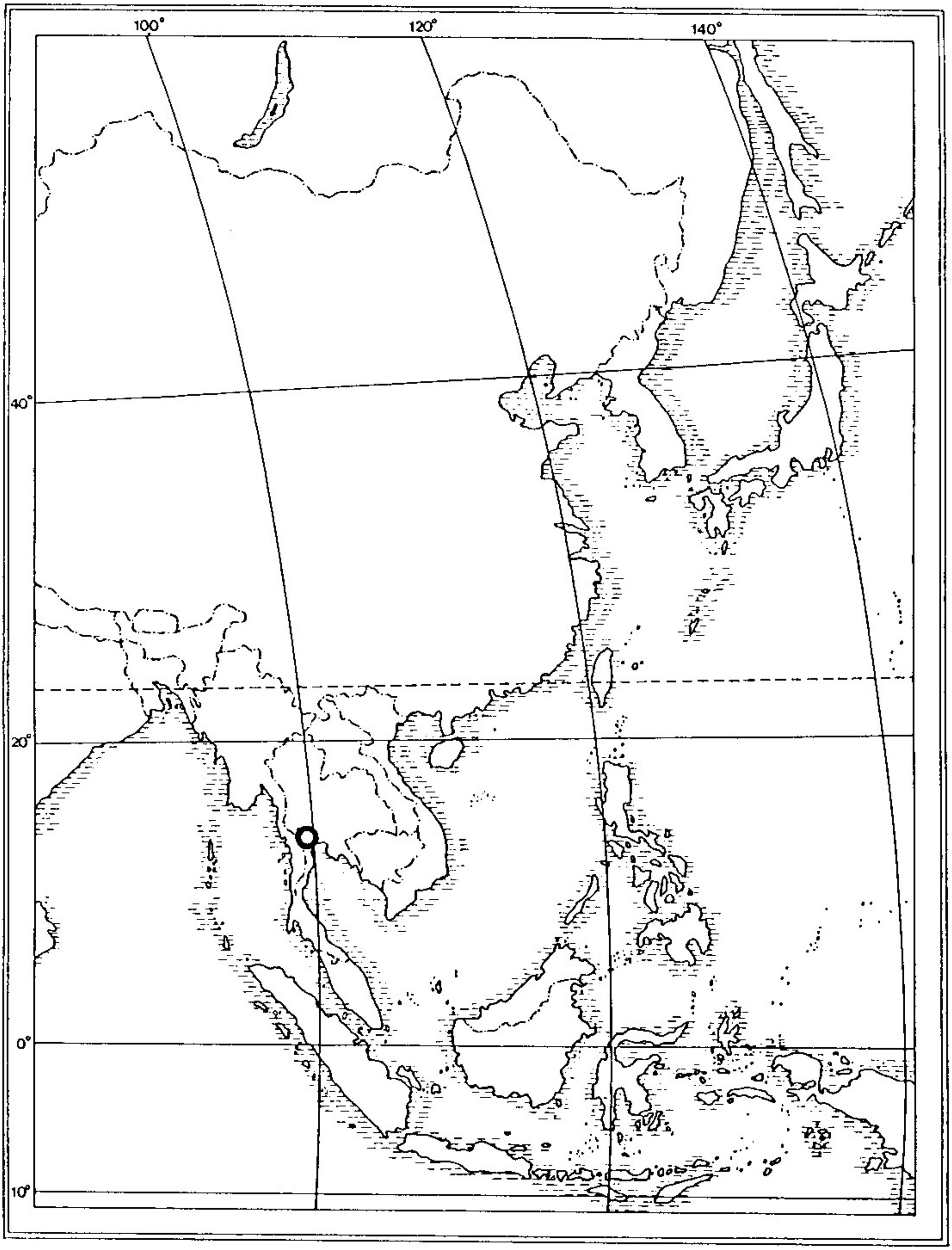

Fig. 40. Distribution of *Ardisia fimbriata*.

7. **Ardisia theaefolia** King & Gamble in Journ. As. Soc. Beng. **74**(2): 152. 1906; Ridley in Journ. Fed. Mal. St. Mus. **4**(1): 46. 1909 & Fl. Malay Penins. **2**: 254. 1923. **Fig. 41**

A small slender erect unbranched shrub up to 2 m high, with short round-capitate hairs on vegetative parts and inflorescences; branchlets brown, glabrous, glabrate when young; hypsophylls present, deciduous, chartaceous, narrowly oblanceolate, 3–5 mm long, 1–2 mm wide, glabrate, punctate; leaves alternate, occasionally subverticillate, chartaceous, elliptic, 4.5–8.8 cm long, 1.6–3.2 cm wide, acuminate to caudate at the apex, acuminate at the base, serrulate, punctate with numerous glands on both surfaces, glabrate when young, lepidote beneath, the lateral veins 6–8 pairs, slightly raised on both surfaces, the midrib subplane above and obviously raised beneath; petioles 0.5–1 cm long, glabrous, glabrate when young. Inflorescences umbellate-paniculate, axillary from hypsophylls or normal leaves; peduncle 2–5.5 cm long, glabrate; bracteoles linear, 2–4 mm long, punctate, ciliate; sepals united about 1/4 their length, the lobes ovate, ca. 0.7 mm long, glabrate, obtuse or acute at the apex, ciliate, punctate; corolla-lobes ovate, pink or white with pink dots, ca. 4 mm long, acute at the apex, punctate; ovary ovate, glabrous; ovules 4–5 in a whorl; filaments very short; anthers ovate-oblong, slightly mucronate at the apex. Fruit globose, 5–6 mm in diameter, dark purple.

Typification. The species is typified by *Wray 1513*, the holotype, collected at Ulu Batang Padang, Perak, Malay Peninsula and now deposited at Kew Herbarium.

Distribution. Malay Peninsula. (Fig. 42).

Ecology. The plants grow in shaded evergreen forests at 1500 to 1900 meters. Flowering specimens were collected in March through June. Fruiting specimens were gathered in October.

Additional specimens examined. **MALAYSIA**. Perak: Gunong Berumbun, *Ridley 13664* (A, 2 sheets), *13665* (BM, K); Gunong Kerbau, *H. C. Robinson s. n.* in June, 1913 (BM, K). Pahang: Gunong Beramban (Cameron Highlands), *J. F. Maxwell 78172* (L); Summit of G. Jasar (Cameron Highlands), *T. C. Whitmore s. n.* in 1970 (L); Sungai (Cameron Highlands), *W. L. Chew 788* (A, K, L); Gunong Jasar, *W. L. Chew 945* (A, K).

Note. *A. theaefolia* is very unusual in having subcoriaceous leaves with numerous dots, young stems glabrous and leaves which are glabrous and acute at both ends, and inflorescences elongate. It is closely allied to *A. fimbriata* Fletcher as suggested by the similarity of their inflorescence and the pattern of foliar punctations. *A. theafolia*, however, differs in having smaller, elliptic, and alternate leaves.

Subsect. 2. **Ardisia** sect. **Odontophylla** subsect. **Gigantifolia** Yang, *subsect. nov.*

Type species. *Ardisia gigantifolia* Stapf.

Suffrutex pilis brevi-capitatis praeditus. Petiolus alatus. Inflorescentia subumbellato-paniculata vel paniculata, floribus multis. Antherae apiculatae vel emarginatae. Ovarium glabrum. Ovula ultra 5.

Description. A shrub pubescent with short round-capitate hairs; petioles winged. Inflorescences subumbellate-paniculate or paniculate, many-flowered; anthers apiculate or emarginate; ovary glabrous; ovules more than 5.

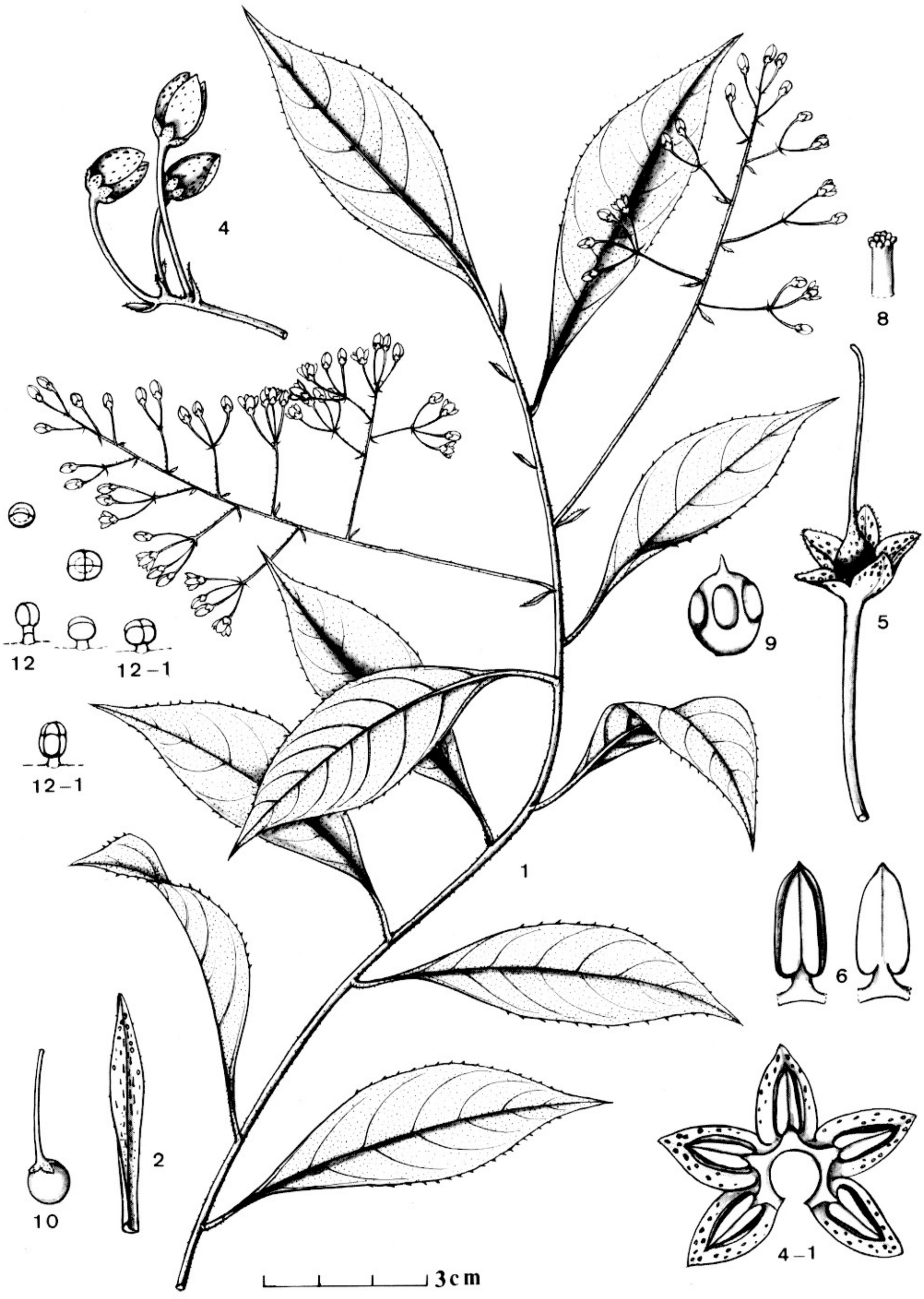

Fig. 41. *Ardisia theaefolia* (*Maxwell 78172*). 1. Habit; 2. Hypsophylls; 4. Floral bud; 5. Pedicel with calyx and a pistil; 6. Stamens; 8. Stigma; 9. Ovules on a placenta; 10. Fruit; 12-1. Round-capitate hairs.

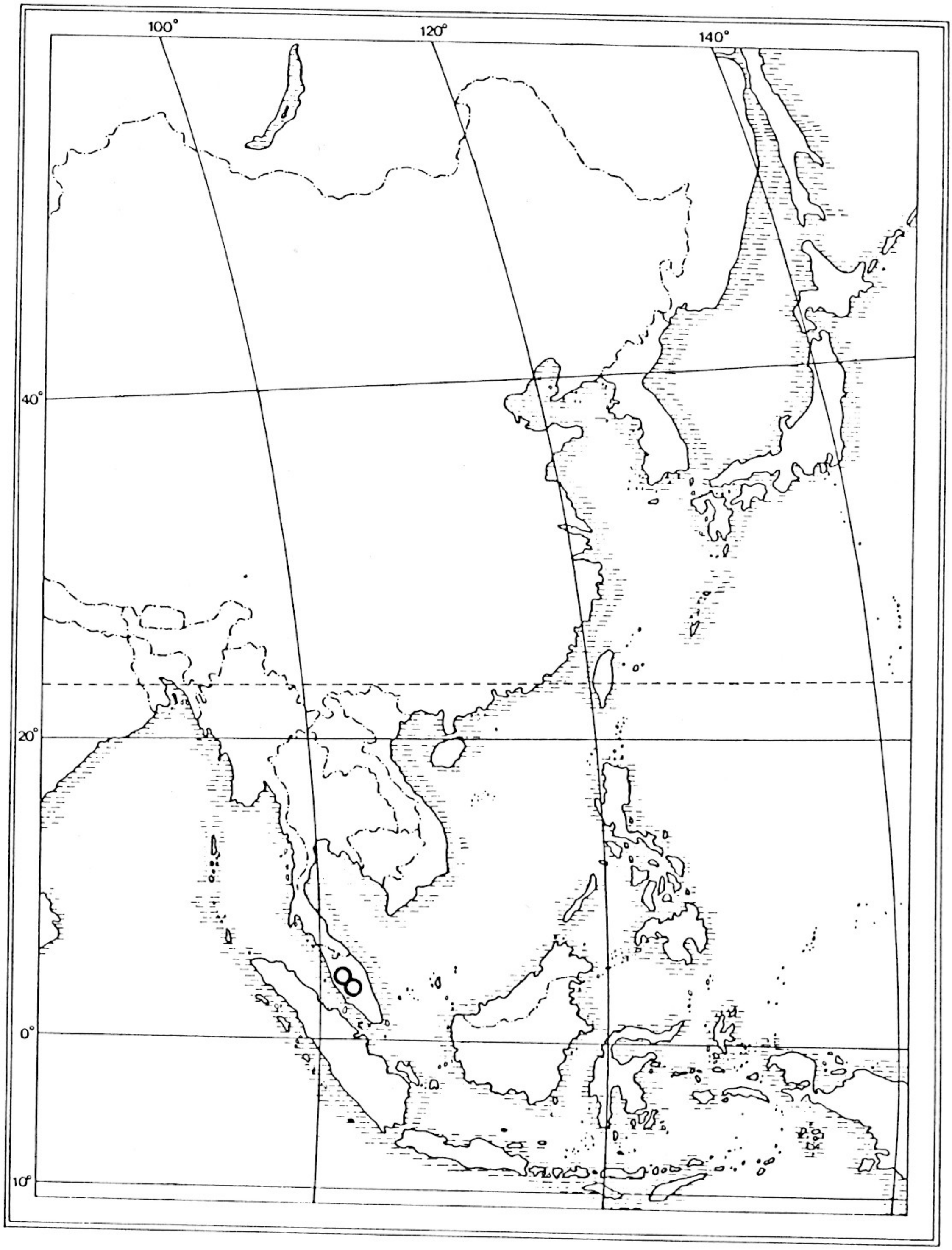

Fig. 42. Distribution of *Ardisia theaefolia*.

8. **Ardisia gigantifolia** Stapf in Kew Bull. **1906**: 74. 1906; Walker in Bull. Fan. Mem. Inst. Biol. Bot. **9**: 167. 1939, in Philipp. Journ. Sci. Bot. **73**: 141. 1940. excl. specimen *H. T. Tsai 51865* & in Journ. Arn. Arb. **23**: 354. 1942; Anonymous, Fl. Hainanica **3**: 174. 1974; C. Y. Wu & C. Chen, Fl. Yunnanica 1: 357. 1977; C. Chen in Agend. Academic. Sinic., Fl. Reipubl. Popul. Sinic. **58**: 93. 1979.

Ardisia kteniophylla A. DC. in Fedde, Repert. Sp. Nov. **8**: 354. 1910.
Ardisia kteniophylla A. DC. var. *microdonta* Pitard in Lecomte, Fl. Gen. Indoch. **3**: 815. 1930. syn. nov.
Ardisia pseudoverticillata Merr. in Journ. Arn. Arb. **8**: 13. 1927; Chen in Sunyatsenia **1**: 287. 1934. **Fig. 43**

A shrub or subshrub up to 3 m high, with a thick creeping rhizome, pubescent with short round-capitate hairs on young vegetative parts and inflorescences; stems erect, thick, ca. 1 cm in diameter, mostly unbranched, slightly pubescent when young, soon glabrous; hypsophylls linear, ca. 1 cm long, deciduous, minutely pubescent, punctate; leaves tufted and rarely subverticillate on the upper stem, subchartaceous, elliptic or long-elliptic or ovate-oblanceolate, acute or acuminate occasionally cuspidate at the apex, 14–56 cm long, 6–17 cm wide, tapering to the base, fimbriate-serrulate, glabrous above, slightly pubescent or glabrous beneath, conspicuously glandular-punctate on both surfaces, dark green above, greyish green or purple beneath, the midrib canaliculate above and conspicuously raised beneath, the lateral veins 15–20 pairs, subplane above and raised beneath; petioles ca. 1.5 cm long. Inflorescences racemose-paniculate or compound paniculate with numerous flowers, axillary from hypsophylls, 20–35 cm long; peduncle pubescent, 8–15 cm long; bracteoles pubescent, elliptic or linear-elliptic, deciduous; rachis pubescent; pedicels pubescent, 0.8–1.4 cm long; sepals united 1/3–1/4 their length, the lobes ovate or broadly lanceolate, acute or broadly acute, ca. 1.5 mm long, obscurely ciliate, minutely pubescent outside, punctate; corolla-lobes ovate, white or pink, acute or obtuse, punctate; stamens ca. 2/3 length of the corolla; anthers ovate, ca. 2 mm long, obtuse at apex, sagittate at the base, slightly pubescent on the back; pistil ca. equaling the length of corolla; style slender, occasionally curved; ovary glabrous or rarely slightly pubescent; ovules 8–12 in a whorl. Fruit somewhat fleshy, reddish, longitudinally striate, somewhat punctate, glabrous, 6 mm in diameter.

Typification. The type specimen at Kew Herbarium has only two leaves and an inflorescence; it was collected from a plant cultivated by Messrs. J. Veitch and Sons (in 1901) from seeds supplied to them by E. H. Wilson in South China.

Distribution. Vietnam and China. (Fig. 44).

Ecology. Plants grow in thick forests or moist places at 400 to 1100 meters. Flowering specimens were collected mostly from April to June, fruiting specimens from November to December.

Additional specimens examined. **VIETNAM.** Annam: Hanoi, *Bon 3158* (P, syntype of *A. kteniophylla* A. DC.); Quan-tri (600 m), *Poilane 10238* (P, syntype of *A. kteniophylla* A. DC. var. *microdonta* Pitard); Nghe-an, *Chevalier 32404* (P, syntype of *A. kteniophylla* var. *microdonta*); Thua-thien, *Eberhardt 3097* (P, syntype of *A. kteniophylla* var. *microdonta*). Tonkin: *Petelot 6469* (A), and *7117* (US), *W. T. Tsang 29012* (A, E, US). **CHINA.** Hainan: Loktung, *Lau 27141* (A); Lingpien, *Tsang, Tang, and Fung 142* (A, K, NY). Kiangsi: Kiennan, *Lau 4193* (US). Kwangsi: Nanning, *R. C. Ching 8384* (NY, pro parte); Sun-shi, *Tsang 22355* (A, NA), and

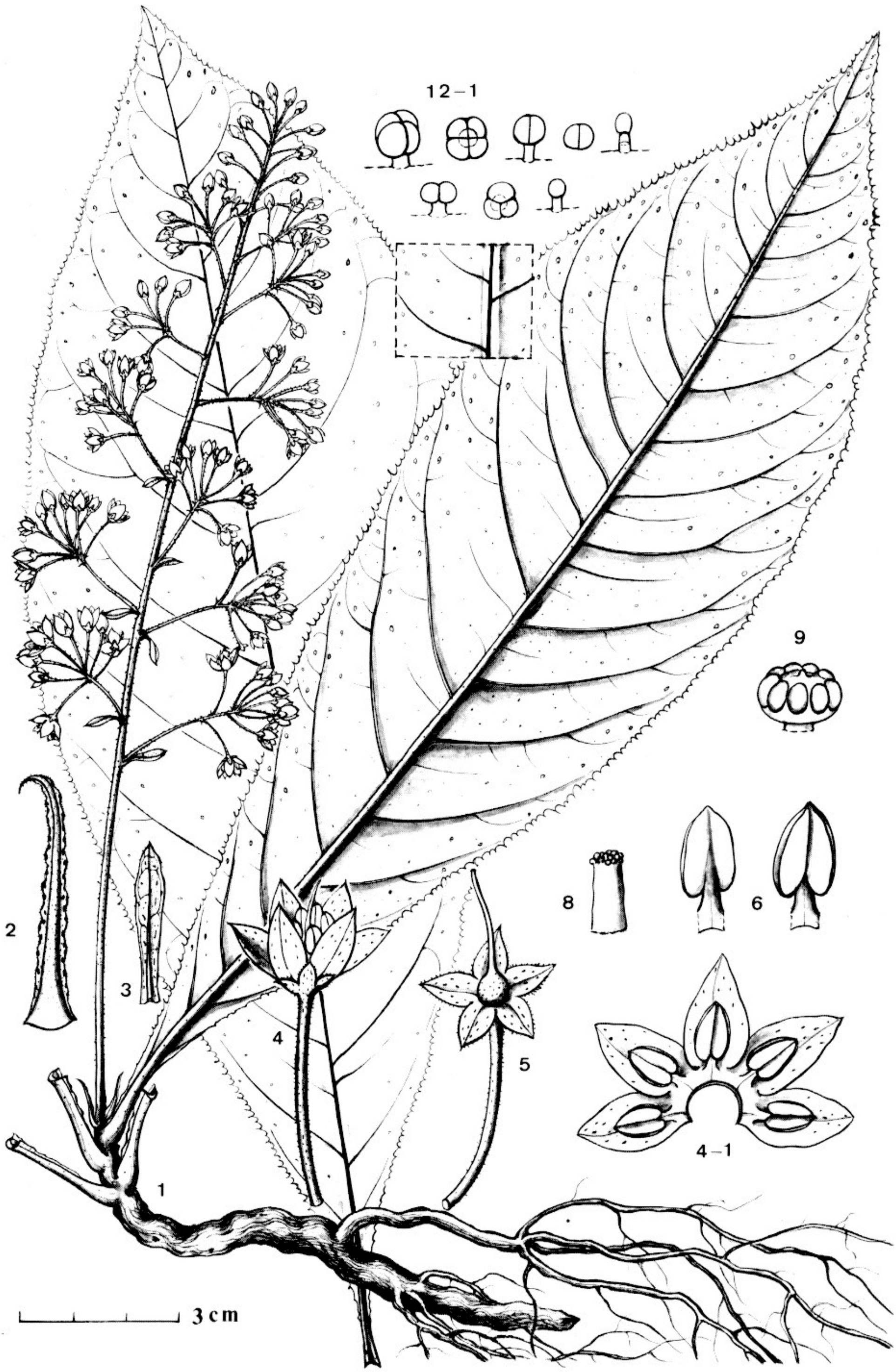

Fig. 43. *Ardisia gigantifolia* (*Tsang 29012*). 1. Habit; 2. Hypsophyll; 3. Bracteole; 4-1. Petals and stamens; 5. Pedicel with calyx and a pistil; 6. Stamens; 8. Stigma; 9. Ovules on a placenta; 12-1. Round-capitate hairs.

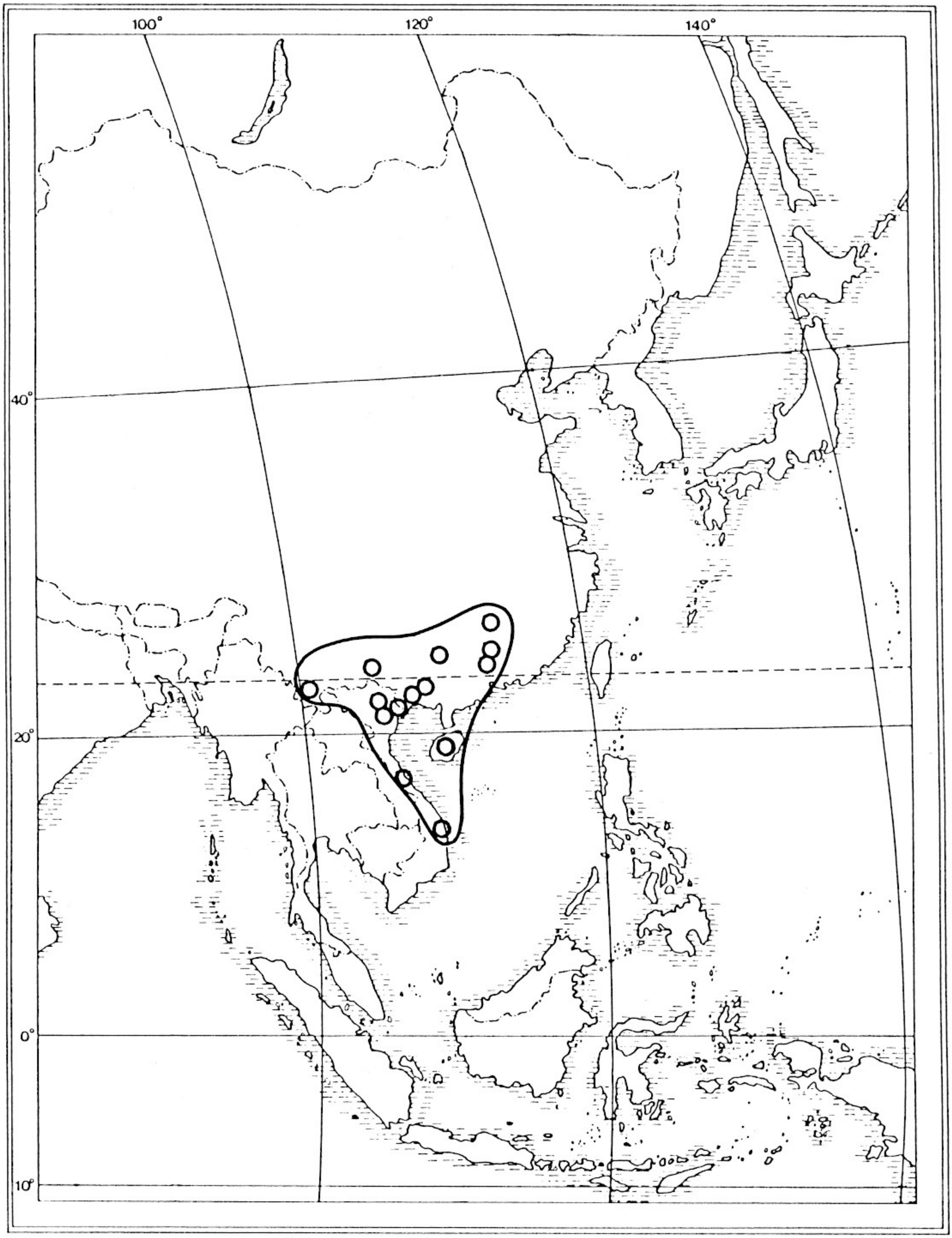

Fig. 44. Distribution of *Ardisia gigantifolia.*

Tsang 24499 (A, F). Kwangtung: Lung-tau Shan, *To, Tsang, and Tsang 658* (*C. C. C. no. 12657*) (BM, E, NA, UC, US, syntypes of *A. pseudoverticillata* Merrill); Own-yuan, *Lau 900* (A, NY); Ying-tak, *Tsang and Chow 3037* (NA, UC). Yunnan: Mong-hai, *F. Kingdon-Ward 12766* (BM); Shi-suan-pan-na, *Li 6011629* (KUN).

Note. *Ardisia gigantifolia* is possibly related to *A. curvistyla* since both share similar leaf texture and open paniculate inflorescences.

9. **Ardidia curvistyla** Yang, *sp. nov.* **Fig. 45**

Suffrutex, caulibus erectis non ramosis, glabris; folia subverticillata, sessilia, elliptica vel obovata, basi attenuata, apice acuminata, 20–30 cm longa, 6–8.3 cm lata, minute dentata, non punctata nervis lateralibus 10–12-jugis; inflorescentia axillaris, racemoso-paniculata, 10–20 cm longa, glabra; sepala ovata, circa 1.2 mm longa, 1 mm lata, punctata, glabra; petala anguste ovata, circa 7.7 mm longa, 3 mm lata, acuminata, non punctata; antherae oblongae, apice emarginatae, in dorso non punctatae; ovarium globrum; fructus ignotus.

A small shrub up to 1.5 m high; stems erect, unbranched (?), glabrous or glabrate with sparsely minute short round-capitate hairs; hypsophylls membranous, narrowly oblanceolate, ca. 1 cm long, glabrous above, with minute short hairs beneath, punctate with black dots; leaves subverticillate, subchartaceous, obovate or elliptic, 20–30 cm long, 6–8.3 cm wide, acuminate at the apex, attenuate at the base, sessile, minutely obtusely dentate, glabrous, punctate with dense minute black dots, the midrib slightly raised above, conspicuously raised beneath, the lateral veins 10–12 pairs, subplane above, raised beneath. Inflorescences racemose-paniculate, axillary from hypsophylls, numerous-flowered, slender, glabrous or with few round-capitate hairs; peduncles 7–12 cm long; rachis 2.2–5 cm long; bracteoles linear, 2–5 mm long, punctate with black dots; pedicels 1–1.3 cm long, glabrous; sepals united near the base, the lobes broadly ovate, ca. 1.2 mm long, 1 mm wide, acute or obtuse at the apex, glabrous, punctate with many black dots, minutely ciliate; corolla-lobes narrowly ovate, ca. 7.7 mm long, 3 mm wide, acuminate at the apex, black punctate; anthers oblong, ca. 3.5 mm long, emarginate at the apex; filaments ca. 0.5 mm long; ovary subglobose, glabrous, punctate with black dots; style slender, curved; ovules ca. 5 in a whorl. Fruit unknown.

Typification. The specimen, *Kosterman 830*, collected at South of Ka Tha Lai, Thailand, and deposited at Kew Herbarium, is here designated as the holotype of this species. A set of two sheets of the isotype is deposited at Arnold Aboretum of Harvard University and Rijksherbarium at Leiden.

Distribution. Thailand. (Fig. 46).

Ecology. Plants grow at 400 to 800 meters. Flowering specimens with young fruit were gathered in June.

Additional specimens examined. A specimen numbered as *L 947230–250* by Rijksherbarium at Leiden was examined. There is no information on the specimen concerning the collector, collecting date, and locality.

Note. *A. curvistyla* differs from all other known species of this subgenus in having long and slender inflorescences, flowers with a strongly curved style, and emarginate apex of anthers.

Subject. 3. **Ardisia** sect. **Odontophylla** Yang subsect. **Odontophylla**.

Type species. *Ardisia odontophylla* Wall. *ex* A. DC.

Description. A small pubescent shrub with elongate-bicellular-capitate hairs;

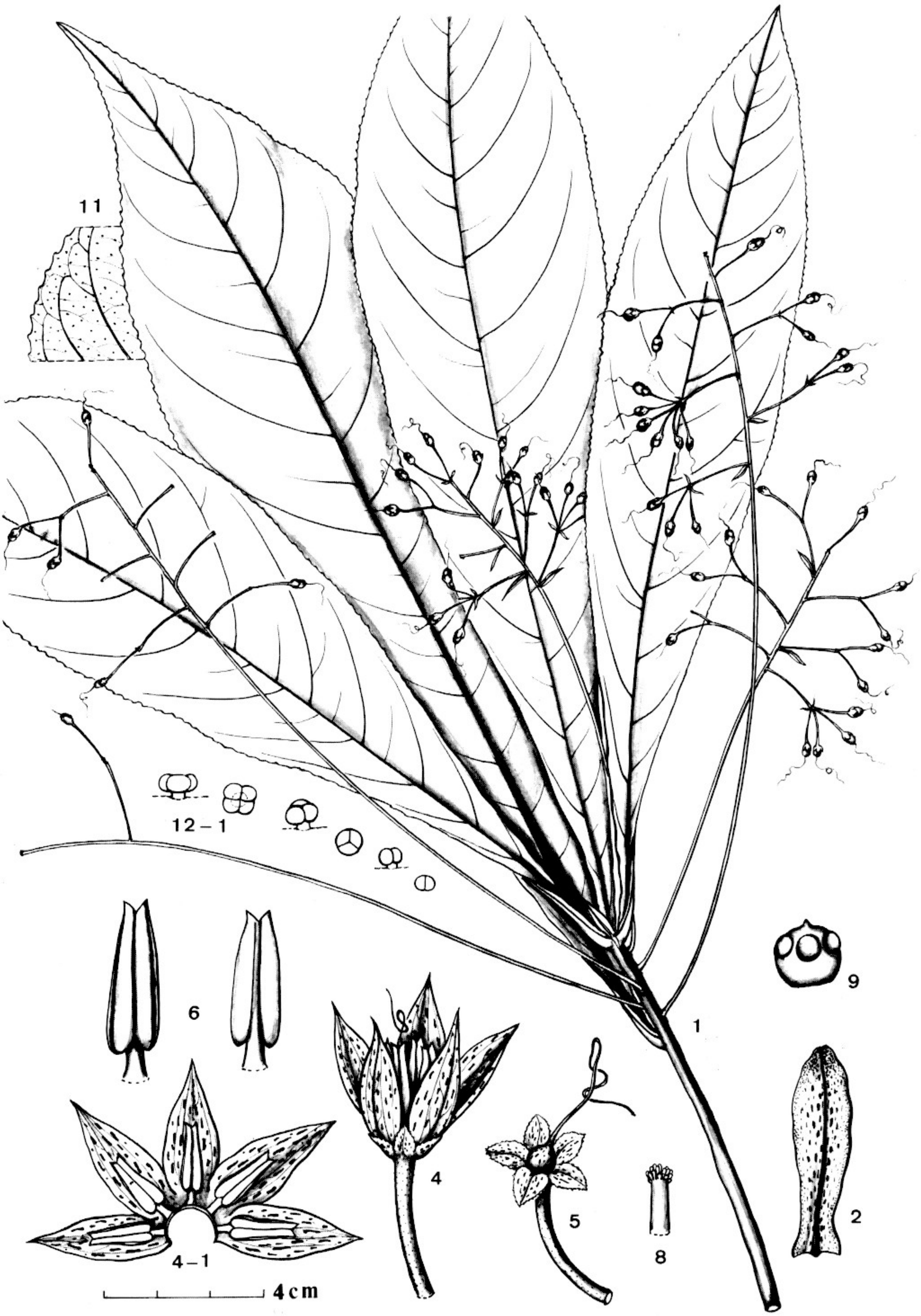

Fig. 45. *Ardisia curvistyla* (*Kosterman 830*). 1. Habit; 2. Hypsophyll; 4. Flower; 4-1. Petals and stamens; 5. Pedicel with calyx and a pistil; 6. Stamens; 8. Stigma; 9. Ovules on a placenta; 12-1. Round-capitate hairs.

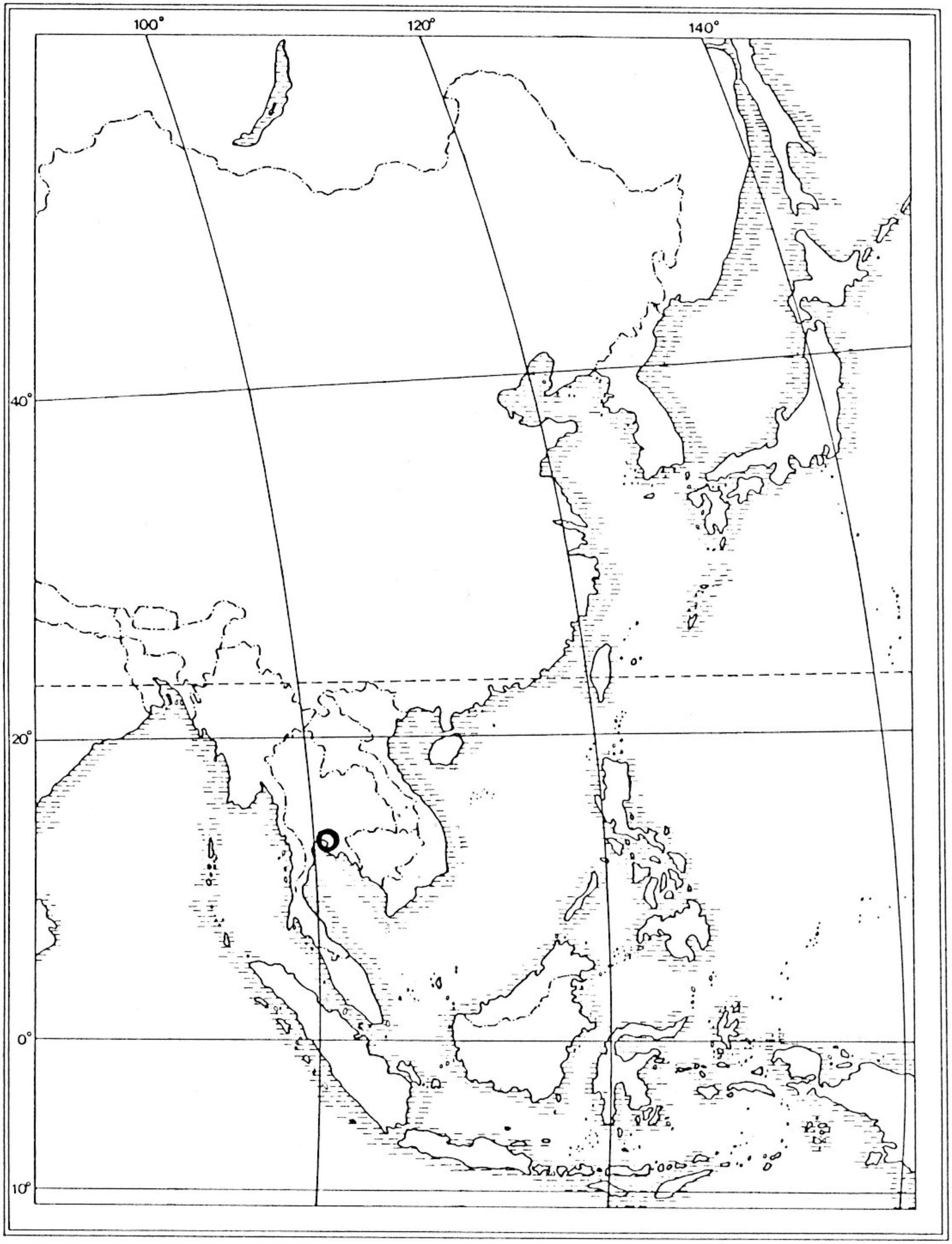

Fig. 46. Distribution of *Ardisia curvistyla*.

petioles winged or not. Inflorescences subumbellate-paniculate or subumbellate or racemose. Ovary pubescent or glabrous.

Note. This subsection includes 15 species.

10. **Ardisia balansana** Yang, *sp. nov.*

Ardisia velutina Pitard in Lecomte, Fl. Gen. Indo-chine **3**: 813. 1930. pro parte.

Ardisia gigantifolia sensu Walker in Bull. Fan. Mem. Inst. Biol. Bot. **9**: 167. 1939 & in Philipp. Journ. Sci. Bot. **73**: 141. 1940. pro parte, quoad specim. H. T. Tsai 51865; non Stapf.

Ardisia sp. Walker in Bull. Fan. Mem. Inst. Biol. Bot. **9**: 170. 1939. quoad specim. *Y. Tsiang 13413* & in Philipp. Journ. Sci. Bot. **73**: 155. 1940. quoad specim. *Y. Tsiang 13413.*

Ardisia botryosa sensu C. Y. Wu & Chen, Fl. Yunnanica **1**: 358. 1977. quoad specim. *H. T. Tsai 51865* & *Y. Tsiang*; non Walker. **Fig. 47**

Suffrutex, rhizomate repente; caules erecti non ramosi, 30-100 cm alti; folia subverticillata, coriacea, obovata, 8-26 cm longa, 3-7 cm lata, apice acuta vel acuminata, basi acuta, eroso-dentata, punctata; petiolus alatus; inflorescentia racemoso-paniculata, 3-6.5 cm longa; pedicelli 3-7 mm longi, minute puberuli; sepala ovata, acuta vel obtusa, 1.6-2 mm longa, minute puberula, punctata; petala ovata acuta vel obtusa, 3-4 mm longa, 1.7-2 mm lata, punctata; antherae oblongo-ovatae, circa 2.4 mm longae, minute apiculatae, non punctatae.

A small shrub with a creeping rhizome, pubescent with elongate-bicellular-capitate hairs on young stems, undersurface of leaves, and inflorescences; stems erect, up to 1 m high, puberulous when young; hypsophylls lanceolate, 6-11 mm long, minutely puberulous; leaves mostly subverticillate, chartaceous, obovate, 8-26 cm long, 3-7 cm wide, acute to acuminate at the apex, acute and decurrent at the base, serrulate, minutely puberulous or glabrous above, puberulous beneath especially on midrib, conspicuously punctate along margins, the lateral veins 11-15 pairs, plane above and raised beneath, the midrib subplane above and conspicuously raised beneath; petioles winged. Inflorescences racemose-paniculate, axillary from hypsophylls, 3-6.5 cm long; bracteoles linear, minutely puberulous, punctate; pedicels 3-7 mm long, minutely puberulous; calyx-lobes ovate, 1.6-2 mm long, ca. 1 mm wide, acute to obtuse at the apex, minutely puberulous, punctate; corolla-lobes light purple, ovate, 3-4 mm long, 1.7-2 mm wide, acute to obtuse at the apex, punctate; anthers oblong-ovate, ca. 2.4 mm long, minutely apiculate at the apex, not punctate; ovary subglobose, minutely puberulous; ovules ca. 5 in a whorl. Fruit globose, red, 6-8 mm in diameter.

Typification. This new species is here typified by *Lue-chung-tuei no. 1702*, collected at Fong-chung-ling, Yuen-yang, Yunnan, in 1974. The holotype type is deposited at the Herbarium of Kunming Institute of Botany, Yunnan.

Distribution. Vietnam and China. (Fig. 48).

Ecology. The plants of this species grow in mixed forests or ravines at 800 to 1550 meters.

Additional specimens examined. **VIETNAM.** Tonkin: Mt. Bavi, *B. Balansa 3945* (P). **CHINA.** Yunnan: Ma-kuan, *H. T. Tsai 51865*(A), *A. C. Wu 8431* (WUK, photo); Mar-li-po, *K. M. Feng 13518* (A), *13927* (A), *22792* (KUN, photo); Ping-bien, *Y. Tsiang 13413* (A, photo); Si-chour-hsien, *K. M. Feng 11787*, *C. W. Wang 85412* (KUN, photo).

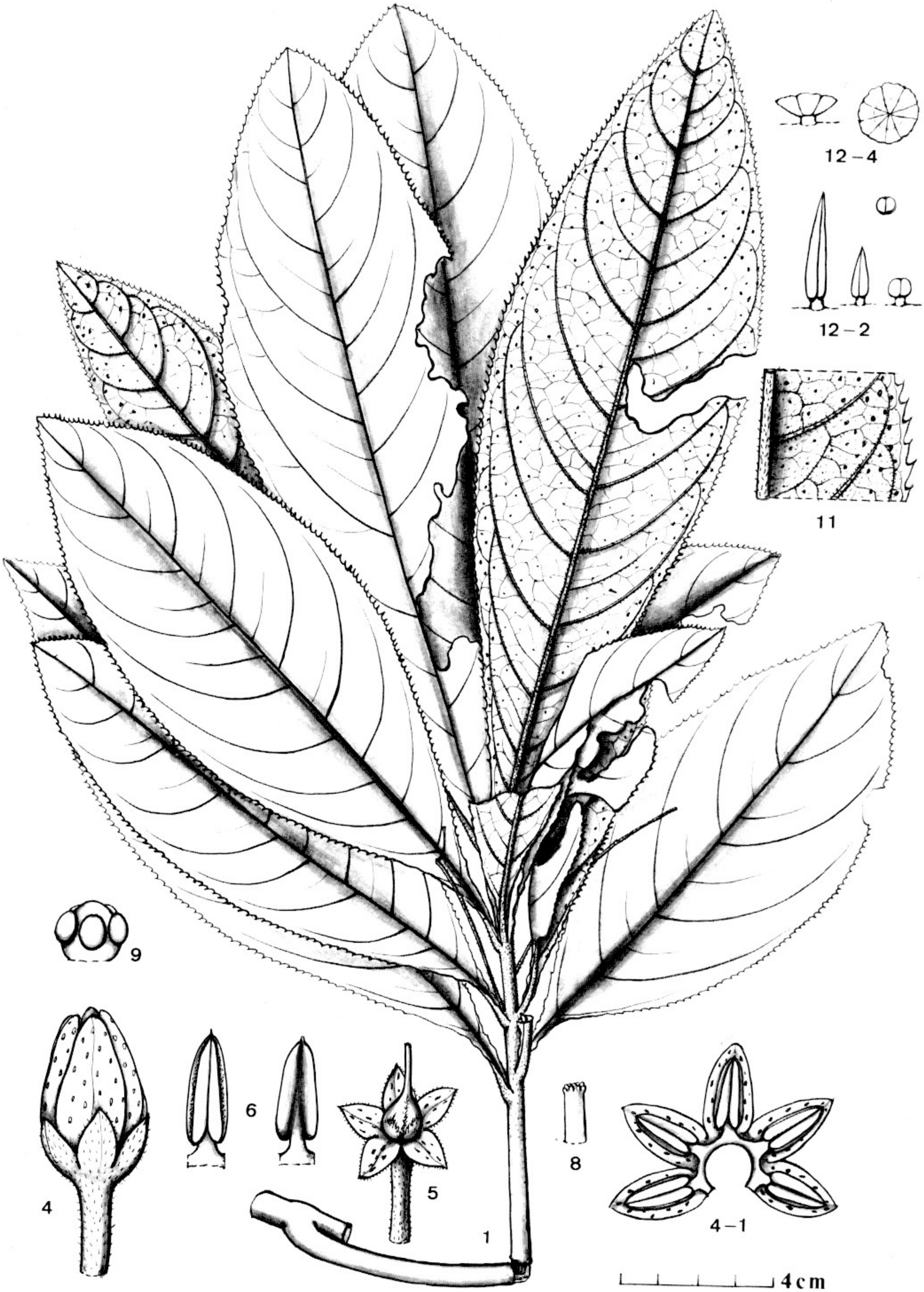

Fig. 47. *Ardisia balansana* (*Balansa 3945*). 1. Habit; 4. Floral bud; 5. Calyx and a pistil; 6. Stamens; 8. Stigma; 9. Ovules on a placenta; 11. Magnified part of a leaf; 12-2. Elongate-bicellular-capitate hairs; 12-4. Round-peltate scales.

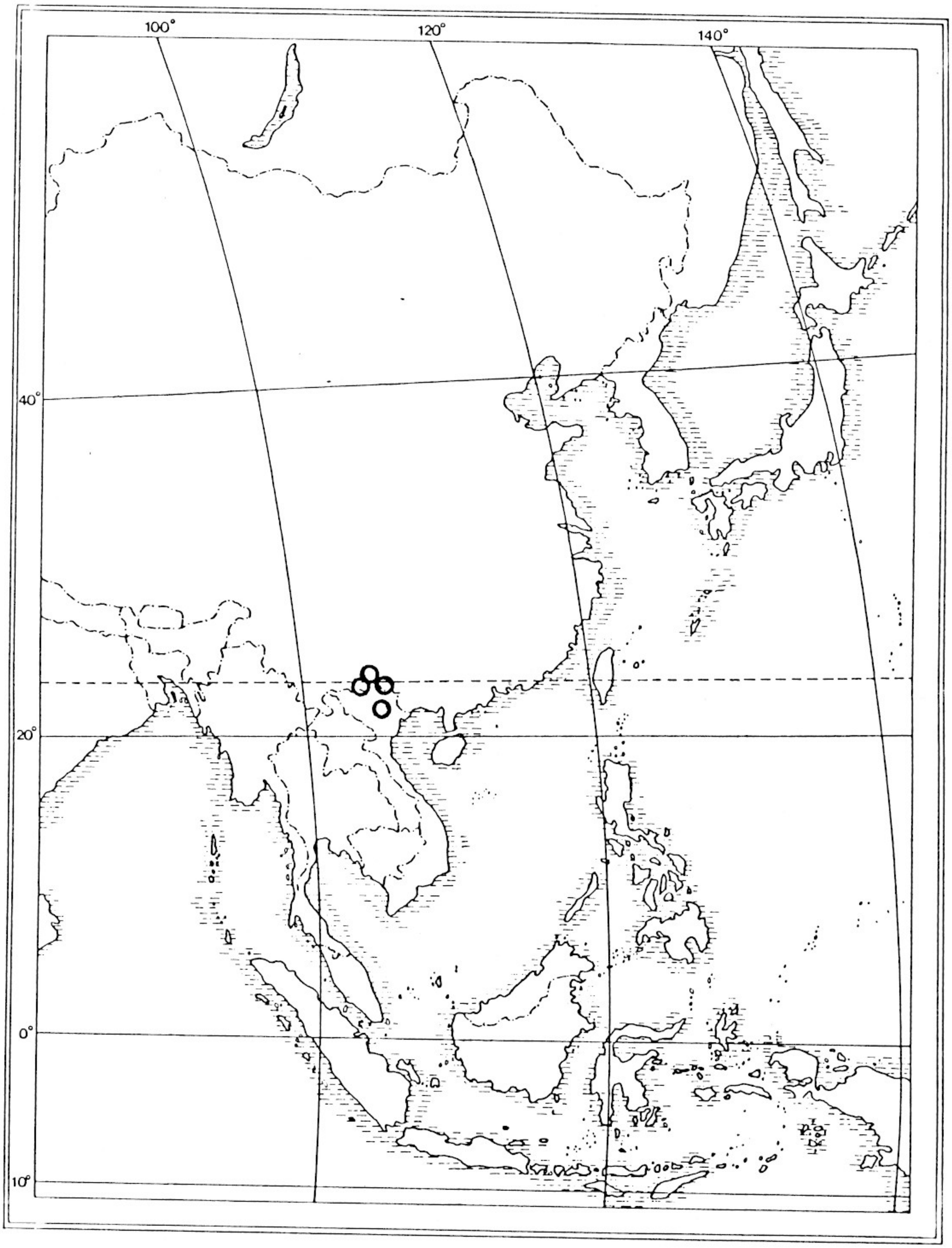

Fig. 48. Distribution of *Ardisia balansana*.

Note. In 1977, Chen identified a specimen, *H. T. Tsai 51865*, as *A. botryosa*. He cited the specimen under that name in his publication "Myrsinaceae" in volume 58 of *Flora Reipublicae Popularis Sinicae*. In fact, that collection represents an undescribed new species since it is distinctly different from *A. botryosa* in having larger leaf size, higher plant body, and especially subumbellate-paniculate inflorescences. This new species is here described and given the binomial *A. balansana* in honor of B. Balansa for his contribution in the collections of Asian *Ardisia*.

This species is however related to *A. velutina* rather than to *A. botryosa*. Both species have leaves with quite similar venation. However, unlike the situation in *A. balasana*, the leaves of *A. velutina* are villose on the undersurface and the inflorescences are more than 14 cm long; this suggests that the two species are not closely related. More specimens and fresh materials of these species are needed to investigate their possible relationship.

11. **Ardisia bambusetorum** King & Gamble in Journ. As. Soc. Beng. **74**(II): 153. 1906; Ridley, Fl. Malay Peninsula **2**: 255. 1923. **Fig. 49**

A small shrub up to 60 cm high with a creeping rhizome, pubescent with elongate-bicellular-capitate hairs on young vegetative parts and inflorescences; stems erect, unbranched, green when young and pale brown when mature, slightly puberulous when young; hypsophylls chartaceous, narrowly linear, ca. 10 mm long, puberulous with elongate-bicelluar-capitate hairs on undersurface and short elongate-bicellular-capitate hairs on uppersurface, ciliate, punctate near the margins; leaves subverticillate, chartaceous, oblong or oblong-lanceolate or obovate-oblong, 10-25 cm long, 2.5-4.8 cm wide, acute at the apex, narrowly attenuate and slightly rounded at the base, slightly puberulous or glabrous above, puberulous or pilose beneath, somewhat punctate chiefly near the margins, the midrib subplane above and raised beneath, the lateral veins 7-11, slightly raised above and raised beneath; petioles 1-3 cm long, canaliculate above, tomentose when young, nearly glabrous when mature. Inflorescences subumbellate, axillary from hypsophylls and leaves, 1.2-3.7 cm long; peduncle puberulous, 1-1.8 cm long; bracteoles minute, subulate, 1-2 mm long, glabrous above, slightly puberulous beneath, ciliate, punctate near the midvein; pedicels slender, puberulous, 5-13 mm long; sepals united near the base, the lobes ovate or linear oblong, 1.1-1.3 mm long, acute, reflexed, punctate or not; corolla-lobes white or purplish, ovate-oblong or ovate, ca. 3.5 mm long, punctate with elongate brown glands; filaments short; anthers long-ovate, ca. 3 mm long, obtuse; ovary glabrous; style glabrous; ovules 5 in a whorl. Fruit unknown.

Typification. The holotype of this species is *King's Collector 10095* (CUL. Holotype), collected at Ulu Bubong of Perak, Malay, in 1886. Only a photograph of the type specimen was examined.

Distribution. Malay Peninsula, and Thailand. (Fig. 50).

Ecology. The collections were made in dense bamboo or evergreen forests at 100 to 180 meters. Flowering specimens were gathered in April.

Additional specimens examined. **THAILAND**. Khlong Nang Yon, Panga, *R. Geesink and T. Santisuk 5078* (L).

Note. This species is closely related to *A. metallica* Brown and *A. maingayi* (Clarke) King & Gamble, but differs from them in having leaves with scattered glands, sepals united near the base, and ovary glabrous.

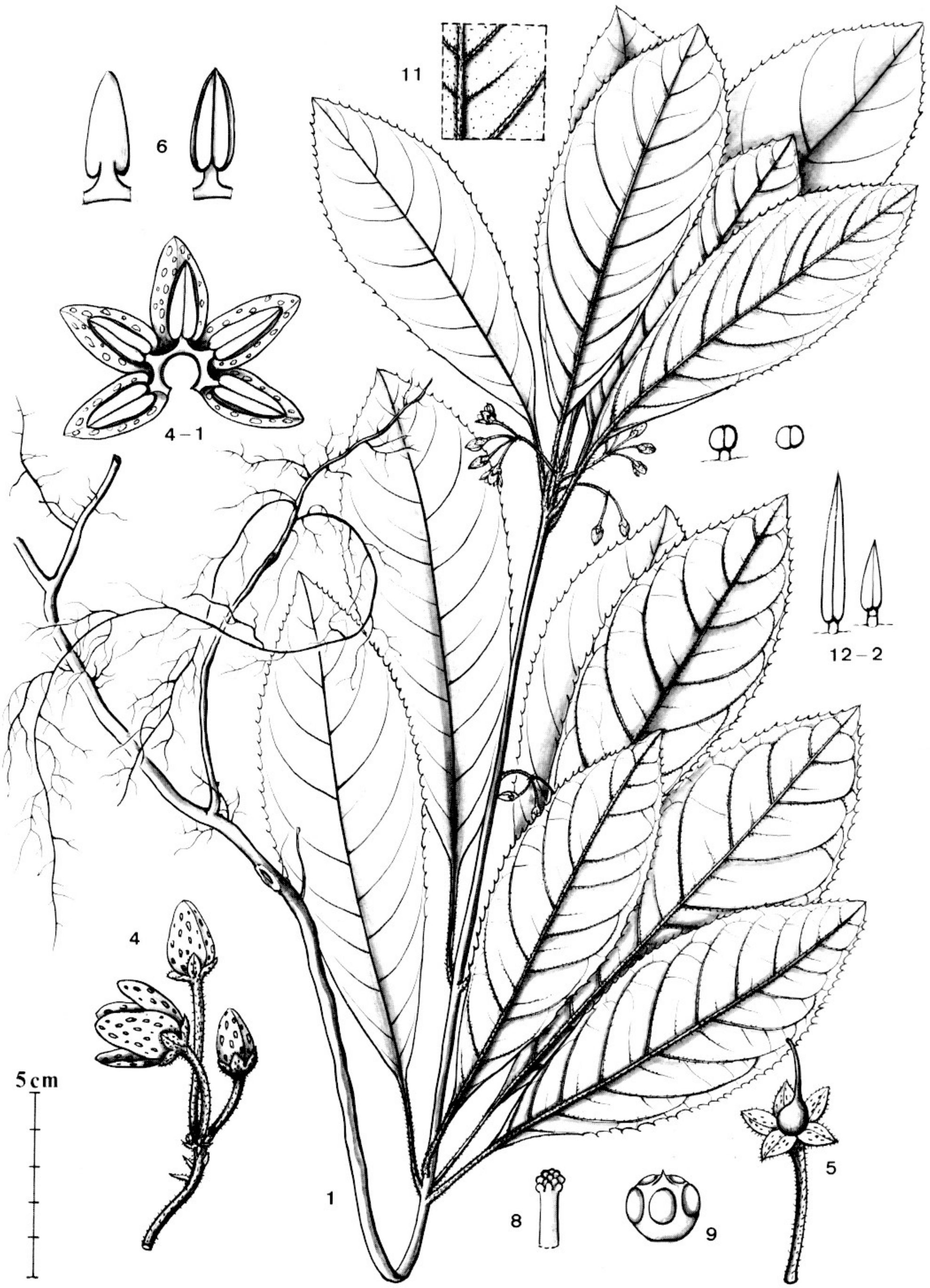

Fig. 49. *Ardisia bambusetorum* (*Geesink* and *Santisuk 5078*). 1. Habit; 4. Floral buds; 4-1. Petals and stamens; 5. Pedicel with calyx and a pistil; 6. Stamens; 8. Stigma; 9. Ovules on a placenta; 11. Magnified part of a leaf; 12-2. Elongate-bicellular-capitate hairs.

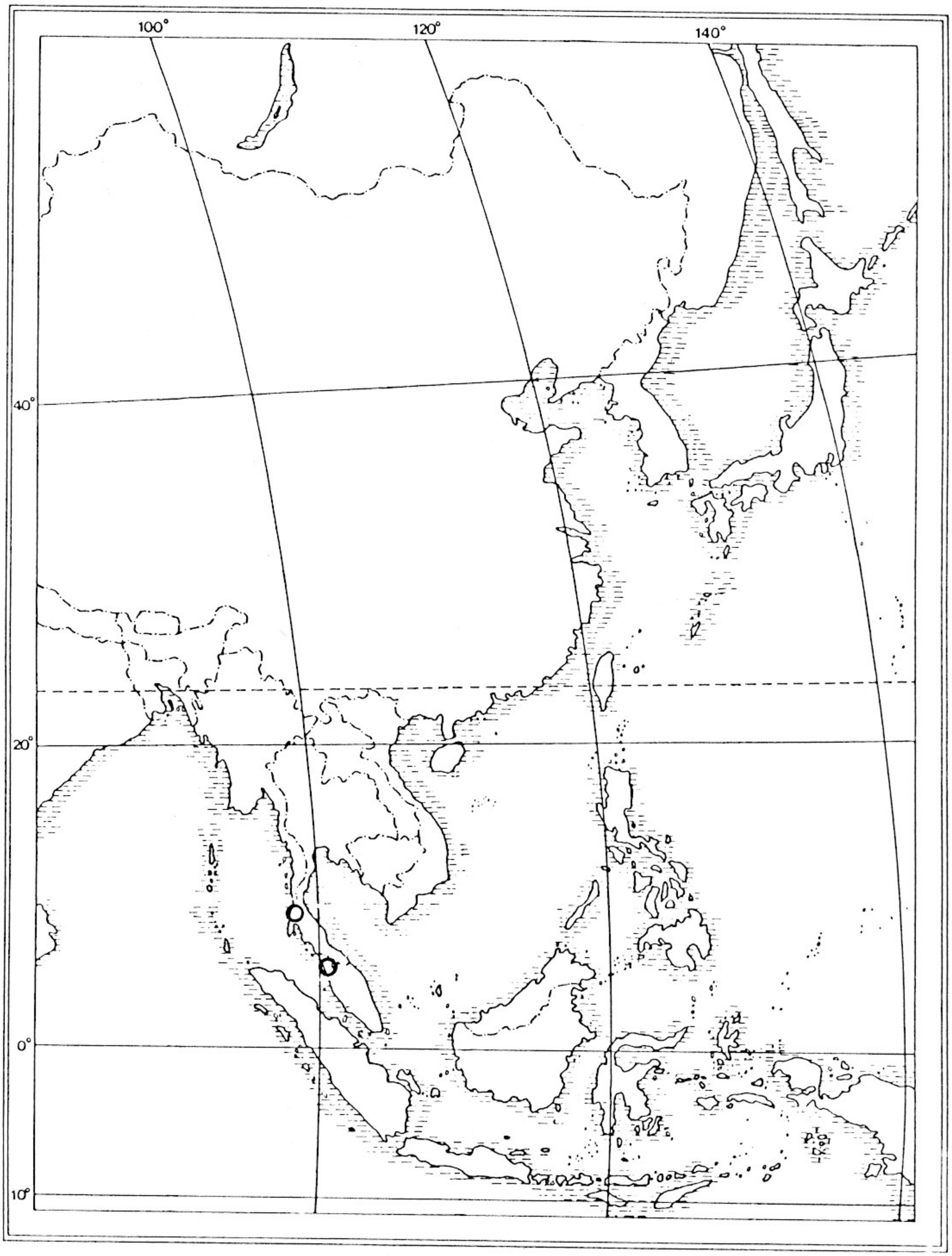

Fig. 50. Distribution of *Ardisia bambusetorum*.

As I had only a single collection and a photo of the holotype available for study, more materials are needed to assess the intraspecific variation and its relationship to other species.

12. **Ardisia botryosa** Walker in Lingnan Sci. Journ. **20**: 189. fig. 3. 1942; C. Y. Wu & C. Chen, Fl. Yunnanica 1: 385. 1977. pro parte; C. Chen in Agend. Acad. Sinic., Fl. Reipubl. Popul. Sinica. **58**: 94. 1979. pro parte.

A small shrub up to 8 cm high with a thick creeping rhizome, pubescent with elongate-bicellular-capitate hairs on vegetative parts and inflorescences; stems erect, slightly puberulous when young, glabrous when mature; hypsophylls unknown; leaves subverticillate, chartaceous, obovate or elliptic, 8–9 cm long, 4–5 cm wide, acute at the apex, decurrent at the base, minutely puberulous beneath, especially on veins, punctate, the midrib subplane above and conspicuously raised beneath, the lateral veins ca. 8 pairs, plane or sometimes canaliculate above and conspicuously raised beneath; petioles broadly crisped-winged, short. Inflorescences racemose, axillary from hypsophylls and leaves, 6–8 cm long; bracteoles subulate or narrowly lanceolate, 2–3 mm long, slightly puberulous beneath, minutey ciliate, slightly punctate; pedicels up to 1 cm long, slightly puberulous; sepals united about 1/4 their length, the lobes ovate, ca. 1.5 mm long, acute to obtuse at the apex, slightly puberulous, ciliate, punctate; flowers otherwise unknown. Fruit globose, reddish, ca. 4 mm in diameter, abundantly punctate.

Typification. The holotype, deposited at the United States National Herbarium, is *A. Petelot 4298*, collected at Chapa, Tonkin, Vietnam, in 1929.

Distribution. Vietnam. (Fig. 51)

Ecology. The species grows in open forests.

Additional specimens examined. **VIETNAM**. Chapa, *A. Petelot 2362* (A, US).

Note. *A. botryosa* is similar to *A. perpendicularis* Walker, from which it is distinguished by its sparse punctate dots, fewer and oblique lateral veins as well as shorter inflorescence.

13. **Ardisia foliosa** Furtado in Singapore Gard. Bull. **17**: 302. 1958.

Ardisia linearifolia Ridl. in Journ. Roy. Asiatic. Soc. Str. Br. **61**: 27. 1912 & Fl. Mal. Peninsula **2**: 255. 1923. **Fig. 52**

A small shrub up to 40 cm high with a creeping rhizome, pubescent with elongate-bicellular-capitate hairs on young vegetative parts and inflorescences; stems erect with short internodes, unbranched, puberulous when young, glabrous when mature; hypsophylls linear, slightly puberulous, somewhat ciliate, the midvein raised beneath; leaves subverticillate, semichartaceous, linear-lanceolate, attenuate at the apex and the base, serrulate, puberulous on both surfaces when young, glabrous when mature, brown above, slightly grey beneath, the midrib subplane above and raised beneath, the lateral veins 14–20 pairs, slightly raised above and raised beneath; petioles 5–10 mm long, puberulous. Inflorescences subumbellate with 3–8 flowers, axillary from hypsophylls or leaves; peduncles 2.5–3 cm long, minutely puberulous; bracteoles linear, ca. 1 mm long, slightly puberulous; pedicels 8–15 mm long, puberulous; sepals united near base, the lobes ovate, ca. 1 mm long, broadly acute, puberulous, ciliate, punctate outside; corolla-lobes with white reddish dots at the apex, ovate, acuminate, punctate; anthers ovate, minutely mucronate at the apex; ovary subglobose, puberulous; ovules 5 in a whorl. Fruit unknown.

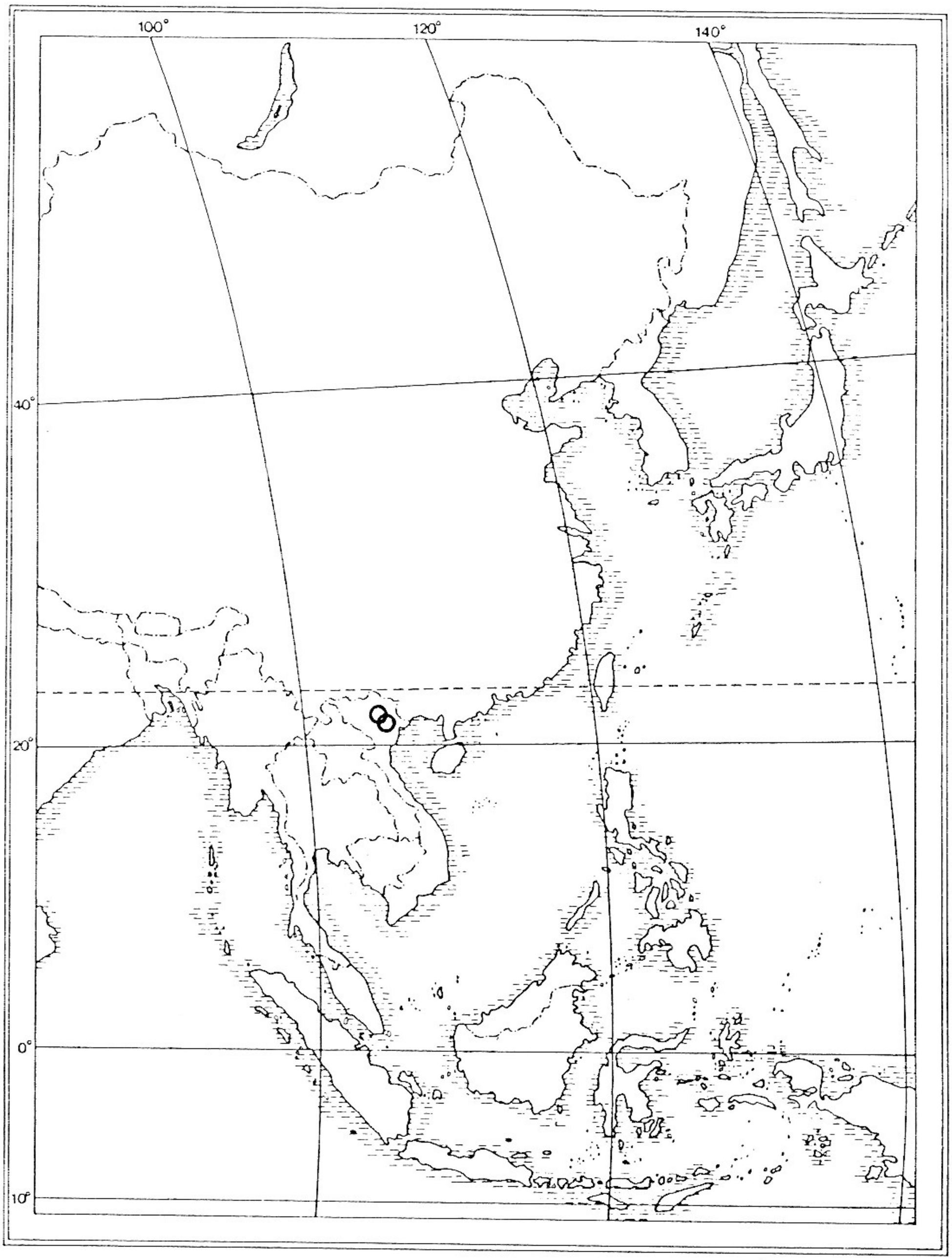

Fig. 51. Distribution of *Ardisia botryosa*.

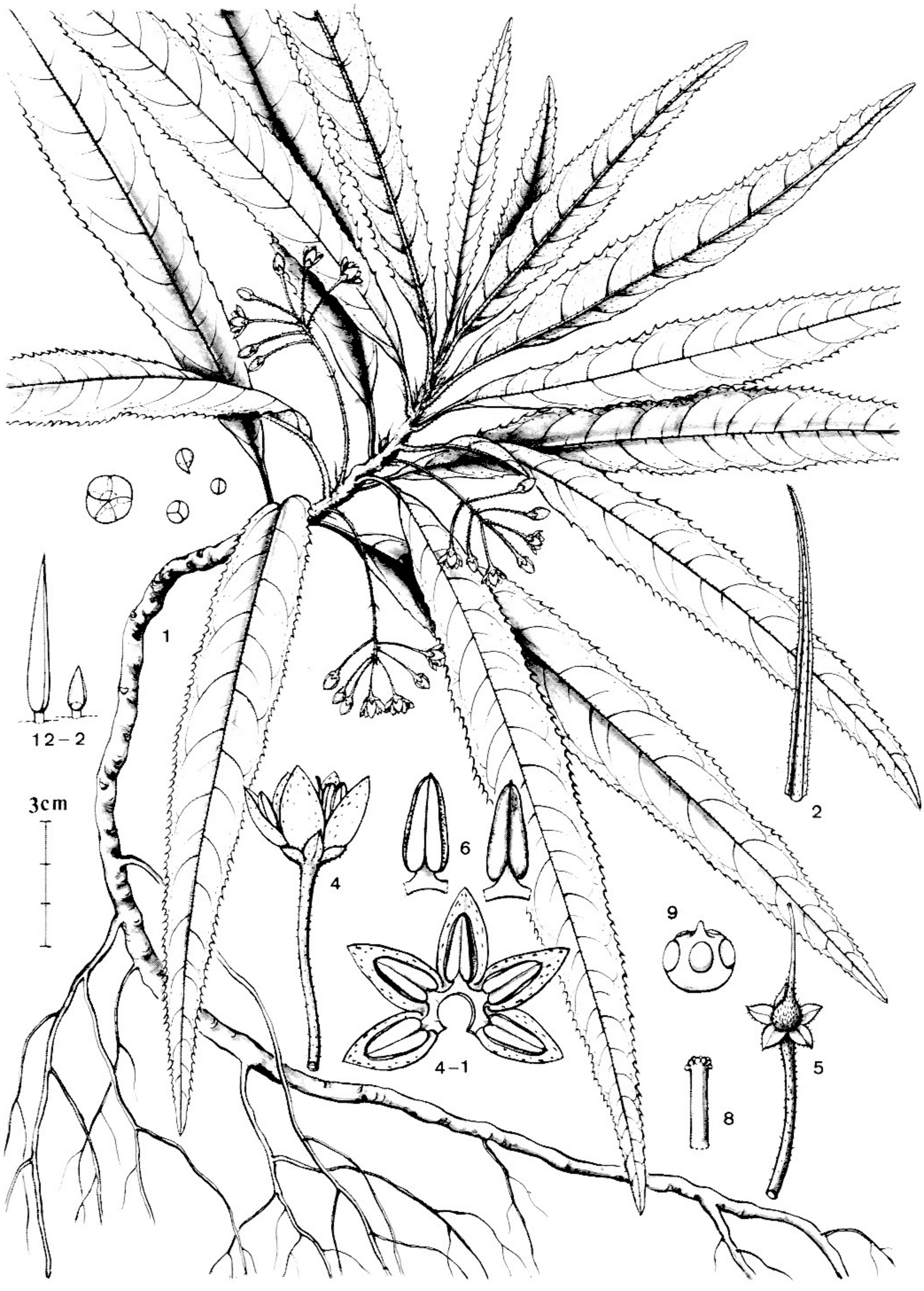

Fig. 52. *Ardisia foliosa* (*Henderson 29656*). 1. Habit; 2. Hypsophyll; 4. flower; 5. Pedicel with calyx and a pistil; 6. Stamens; 8. Stigma; 9. Ovules on a placenta; 12-2. Elongate-bicellular-capitate hairs.

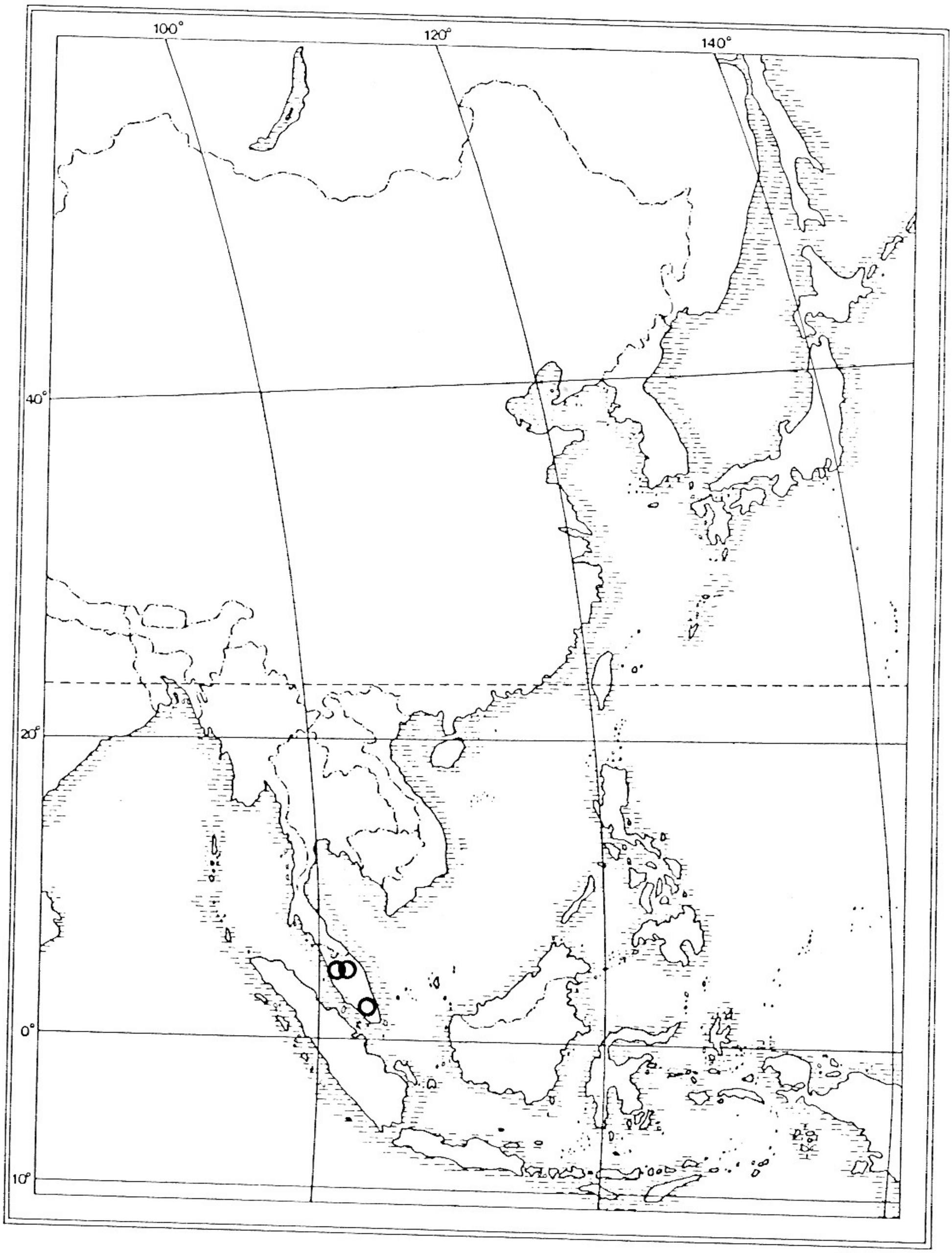

Fig. 53. Distribution of *Ardisia foliosa*.

Typification. Based on a fragment from a cultivated plant in the Singapore Botanic Garden, this species was first named by Ridley as *Ardisia linearifolia.* In 1958, Furtado reduced this species to synonomy as a later homonym, establishing a new binomial, *Ardisia foliosa*, and designating another holotype (*M. R. Henderson 29656*). Furtado explains his reason for suggesting another holotype: "the species was based on a fragmentary material cultivated in Botanic Garden, Singapore,.... (this has) induced me to establish a new species (name) based on better material the duplicates of which have been widely distributed." On comparing the type specimen used in preparing the original description with the plate showing the leaf shape and floral structure, it is obvious that the type specimen is in good condition. In addition, there is no nomenclatural rule against a cultivated plant or a sole collection being designated a type, I temporarily reserve the type collection of *Ardisia linearifolia* Ridley as the holotype of *Ardisia foliosa* Furtado; this was collected by Mhd. Aniff at Gunong Bongsu, Wellesley, Malay Peninsula, and is now deposited at the Herbarium of Singapore.

Distribution. Malay Peninsula. (Fig. 53)

Ecology. Flowering specimens were collected in June and July.

Additional specimens examined. **MALAYSIA.** Kelantan: Gua Musang-Kuala Betis track, *M. R. Henderson 29656* (L). Johore: Sungei Kayu, *Kiah 32330* (K, L).

Note. The linear leaves immediately distinguish *A. foliosa* from all other species in the proposed subgenus. An additional unique feature is that the leaves are crowded along the stems.

A. maingayi is probably related to *A. foliosa* since both have similar inflorescences; the linear leaves and crowded leaves on the stems of the latter, however, readily distinguish it from the former.

14. **Ardisia maingayi** (Clarke) King & Gamble in Journ. As. Soc. Beng. **74**(II): 151. 1906. pro parte minor & descr. emend.

Ardisia odontophylla Wall. *ex* DC. var. *lobbii* Clarke in Hooker f., Fl. Br. Ind. **3**: 526. 1882.

Ardisia odontophylla sensu Mez in Engl., Pflanzenr. **9** (IV. 236): 150. 1902. pro parte; non Wall. *ex* A. DC.

Ardisia odontophylla Wall. *ex* A. DC. var. *maingayi* Clarke in Hook. f., Fl. Br. Ind. **3**: 526. 1882.

Ardisia ordinata Walker in Philipp. Journ. Sci. Bot. **73**: 137. 1940; Anonymous, Fl. Hainanica **3**: 175. 1974; C. Chen in Agend. Academ. Sinic., Fl. Reipubl. Popul. Sinic. **58**: 95. 1979. *syn. nov.* **Fig. 54**

A small shrub up to 1 m high with a creeping rhizome, pubescent with elongate-bicellular-capitate hairs on young vegetative parts and inflorescences; stems erect, rarely branched, puberulous or tomentose or rarely glabrous when young, glabrous or nearly so when mature; hypsophylls deciduous, narrowly lanceolate, 0.7–1.3 cm long, puberulous, punctate, the midvein conspicuously raised; leaves subverticillate, chartaceous, oblanceolate or obovate or linear-obovate or elliptic, 5.5–19 cm long, 2.9–6.3 cm wide, acuminate or acute or rarely obtuse at the apex, attenuate or acute or rounded at the base, serrulate, puberulous above, velutinous or puberulous beneath, densely pellucid-punctate when transilluminated, the lateral veins 9–14 pairs, plane above and raised beneath, the midrib plane or canaliculate above, conspicuously raised beneath; petioles canaliculate above, 1–3 cm long, puberulous

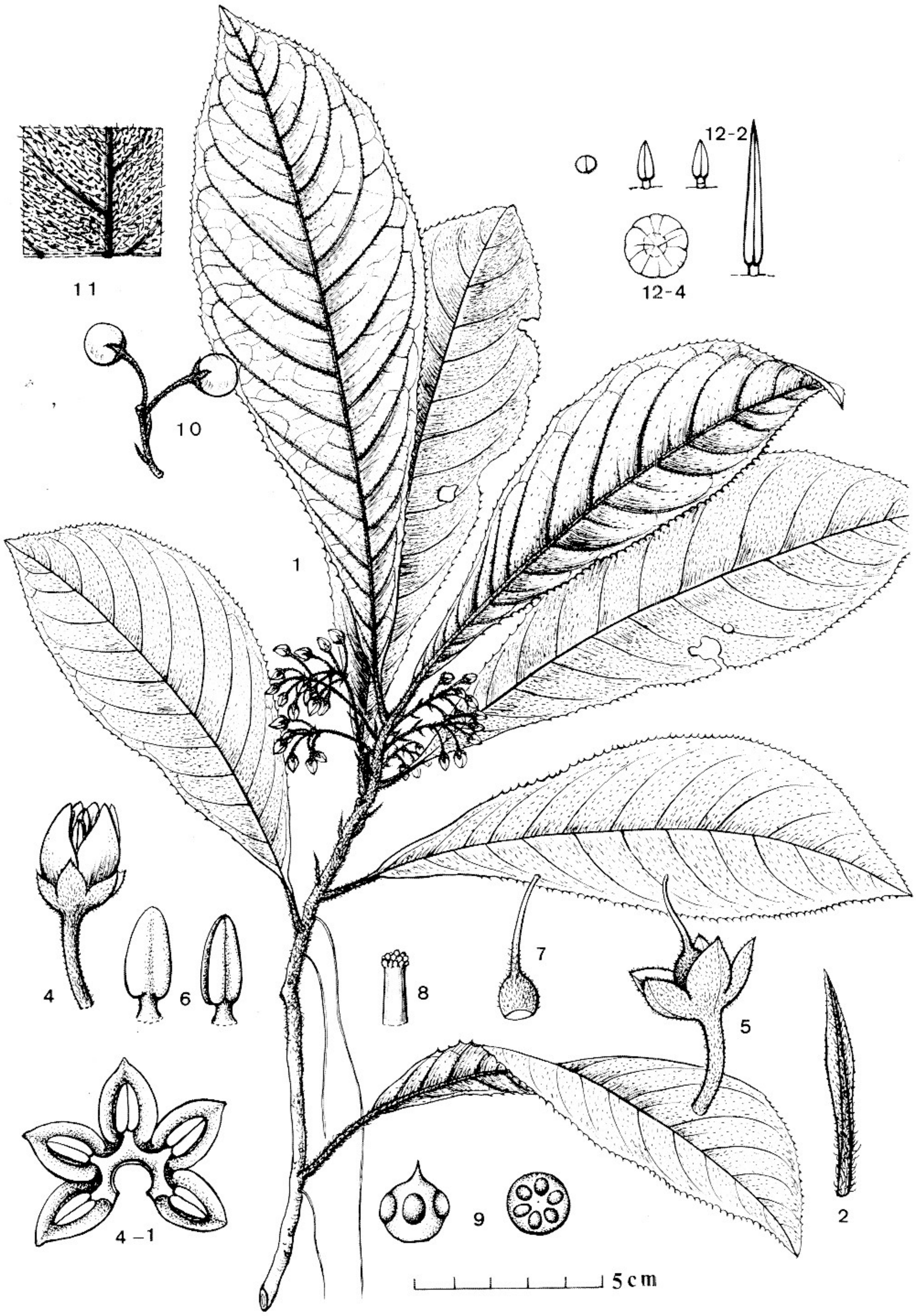

Fig. 54. *Ardisia maingayi* (*Lobb 316*). 1. Habit; 2. Hypsophyll; 4. Floral bud; 4-1. Petals and stamens; 5. Pedicel with calyx and a pistil; 6. Stamen; 7. Pistil; 8. Stigma; 9. Ovules on a placenta; 10. Fruit; 12-2. Elongate-bicellular-capitate hairs; 12-4. Round-peltate scales.

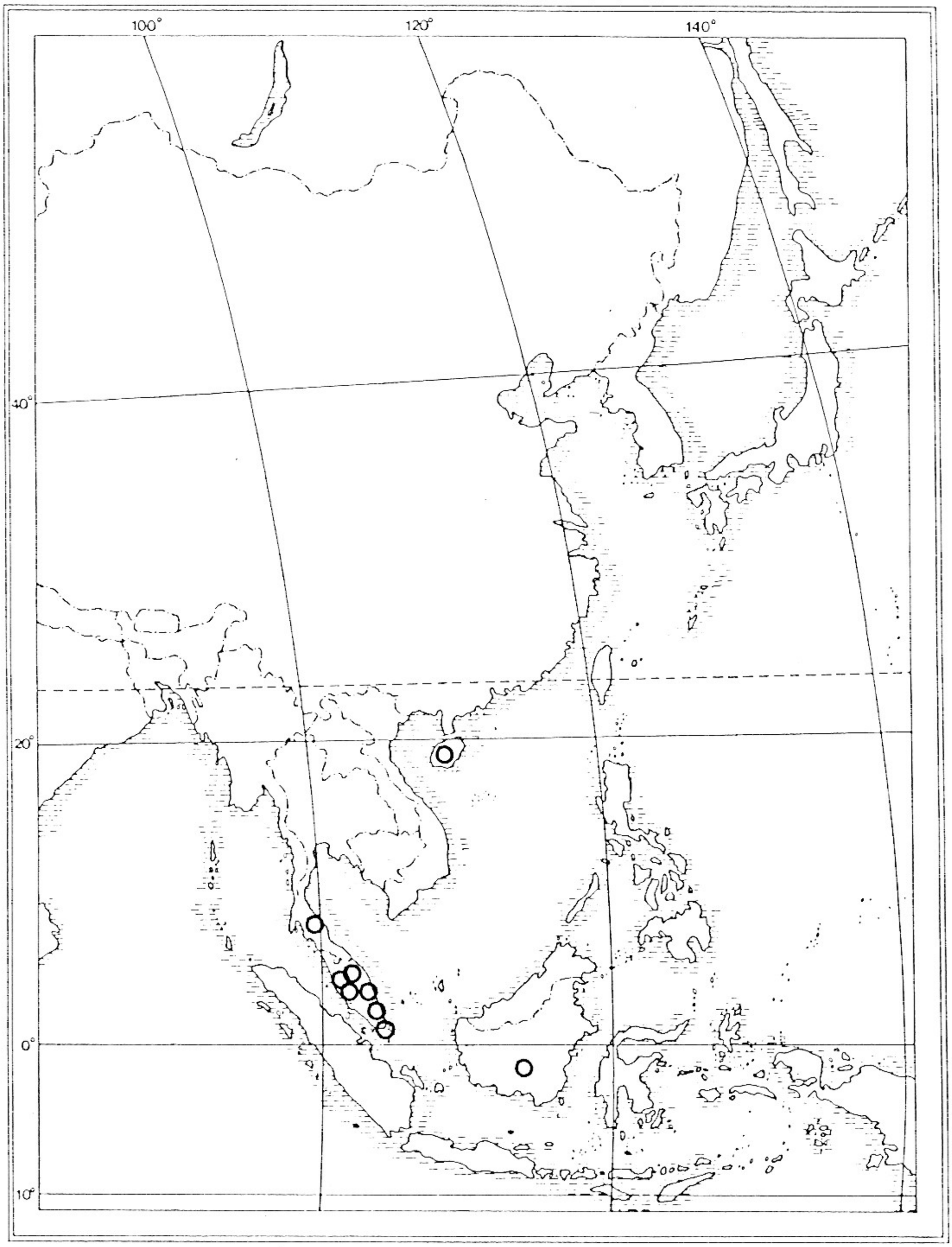

Fig. 55. Distribution of *Ardisia maingayi*.

or tomentose or rarely glabrate. Inflorescences subumbellate or subumbellate-paniculate axillary from hypsophylls and leaves; peduncles 0.6–2 cm long, slightly puberulous; bracteoles linear, ca. 1.5 mm long, slightly puberulous; pedicels 5–7 mm long, slightly puberulous, punctate along the midvein; sepals united near the base, the lobes triangular or linear-triangular, ca. 1 mm long, acute or acuminate at the apex, slightly puberulous outside, minutely ciliate, slightly punctate; corolla-lobes pink, linear-ovate, ca. 4 mm long, acute at the apex, punctate; anthers ovate, obtuse at the apex; ovary subglobose, puberulous, punctate; ovules 5–6 in a whorl.

Typification. This species is based on *Ardisia odontophylla* Wall. *ex* A. DC. var. *maingayi* Clarke which is typified by *Maingay 1016* (K).

Distribution. Borneo, Malaya, Thailand, and China. (Fig. 55).

Ecology. Collections were made in primary forests at 0–300 meters.

Additional specimens examined. **BORNEO**. Central Kalimantan: Upper Katingan River, *Mogea 4179* (L); Woyon (SW. Bintoct), *Winkler 3361* (BM, L). **CHINA**. Hainan: Loktung, *S. K. Lau 27381* (A, K, NA, the types of *A. ordinata*). **MALAYSIA**. Johor: Sungai Sedili (Mersing Rd.), *E. T. H. Corner s. n.* in 1936 (BM, K). Kelantan: Hutan, Kelantan, *Mahmud Sider 3194* (L). Malacca: Malacca, *M. D. A. C. Maingay 1016* (K, type of *A. odontophylla* var. *maingayi*). Pahang: Sungai Teku, *Mohd. Shah 1380* (L); Taman Negara, *v. Balgooy 2609* (L). No further locality: *King's collector 7367* (E). **THAILAND**. Nakhon Si Thammarat: Khao Luang, *C. F. van Beusekom and C. Phengkhlai 816* (E, K, L). Ranong: Khlong Kam Puan, *R. Geesink and T. Santisuk 5105* (L).

Note. In 1882, Clarke described a variety, *maingayi* of *A. odontophylla* Wall. *ex* A. DC., citing Maingay's collection without number from Malacca, Malay Peninsula. However, only one Maingay collection, *Maingay 1016*, collected from Mallaca, could be found at the Herbarium Kew. In 1906, King and Gamble described a species, *A. maingayi*, giving a synonym *A. odontophylla* var. *maingayi* Clarke and citing a collection, *Maingay 1016*. Although King and Gamble did not mention that they elevated the variety to specific rank, the elevation can be inferred from the synonym. Unfortunately Clarke did not indicate the collection number of the varietal type, *Maingay 1016*, however, is presumably the type collection because the collection not only is the only one presumably known but it was also examined by Clarke (his label is on the specimen sheet) and was also cited by King and Gamble.

After examination, I found that the number in fact represents *A. odontophylla* var. *lobbii* since it is distinctly different from King and Gamble's *A. maingayi* in having a puberulous ovary and longer petioles. This situation results in that *A. maingayi* and *A. odontophylla* var. *lobbii* are conspecific. *A. maingayi* is therefore the binomial of the species in terms of its prior varietal description and prior status elevation. In addition, *A. cameronensis* Yang is the epithet given to King and Gamble's *A. maingayi*.

A. maingayi has been confused with *A. odontophylla* A. DC. by many authors. The former differs from the latter in having shorter petioles, densely punctate leaves, and triangular calyx-lobes. Additionally, these two species are geographically isolated; *A. maingayi* is distributed in Malay Peninsula, Borneo, and Thailand; *A. odontophylla* A. DC. is limited to Assam, India, and Burma.

15. **Ardisia cameronensis** Yang, *sp. nov.*

Fig. 56. *Ardisia cameronensis* (Singapore Field no. *33158*). 1. Habit; 2. Hypsophyll; 3. Bracteole; 4-1. Petals and stamens; 5. Pedicel with calyx and pistil; 6. Stamens; 8. Stigma; 9. Ovules on a placenta; 12-1. Round-capitate hairs; 12-2. Elongate-bicellular capitate hairs; 12-4. Round-peltate scales.

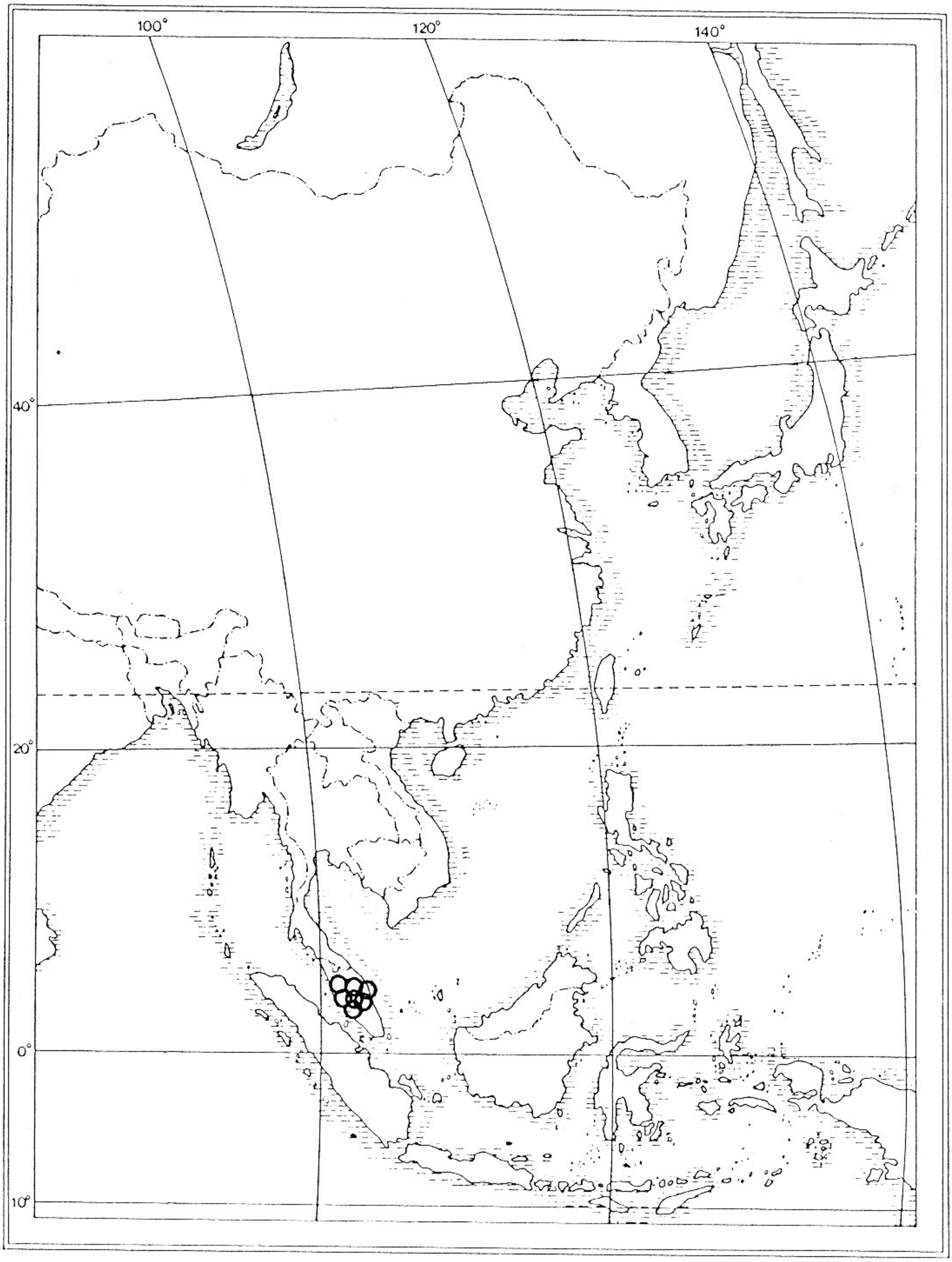

Fig. 57. Distribution of *Ardisia cameronensis*.

Ardisia maingayi (Clarke) King & Gamble in Journ. As. Soc. Beng. **74** (II): 151. 1906. pro part. major. **Fig. 56**

A small erect shrub, rarely branched, ca. 50-60 cm high, pubescent with short elongate-bicellular-capitate hairs, very rarely with both short and long elongate-bicellular-capitate hairs on young vegetative parts and inflorescences; stems pubescent or rarely velutinous when young, glabrous when mature; hypsophylls chartaceous, narrowly oblanceolate, 7-15 mm long, acuminate at the apex, attenuate at the base, pubescent or rarely velutinous, somewhat punctate; leaves subverticillate, chartaceous, elliptic or obovate-elliptic or narrowly ovate, sessile or subsessile, 12-25 cm long, 2.9-6.5 cm wide, acuminate at the apex, attenuate at the base, serrulate, glabrate or rarely velutinous beneath, glabrous or nearly so above, punctate, the midrib canaliculate above and raised beneath, the lateral veins 6-14 pairs, plane above and slightly raised beneath. Inflorescences racemose-paniculate, axillary from hypsophylls or leaves; peduncles 3.5-11 cm long, minutely pubescent or rarely velutinous; bracteoles oblanceolate or elliptic, 2-5 mm long, pubescent; sepals united 1/3-1/4 their length, the lobes ovate or slightly linear-ovate, 1-2 mm long, obtuse or rarely acute at the apex, pubescent outside, ciliate, punctate; corolla-lobes pink or white, ovate, 3-3.7 mm long, 1.8-2.2 mm wide, glabrous, punctate; filaments short, ca. 0.5 mm long, glabrous; anthers ovate, ca. 2 mm long; ovary globose, glabrous or rarely glabrate on upper part; ovules 5-6 in a whorl. Fruit red, 6-7 mm in diameter.

Typification. The flowering and fruiting specimen (*L. Wray 1579*, at K), collected at Ulu Batang, Padang, is here designated as the holotype of *A. cameronensis* Yang.

Distribution· Malay Peninsula. (Fig. 57).

Ecology. Plants grow in forests at 1200 to 1400 meters.

Additional specimens examined. **MALAYSIA**. Pahang: no further locality, Anonymous *s.n.* in 1911 (K); Cameron Highland, *Md. Nur s.n.* in 1937 (A, UC); Tahan, *H.N. Ridley 16237* (BM, K). Perak: no further locality, *Scortechini 335* (K, NY), *et 339* (K). Selangor: no further locality, *s.n.* in 1904 (K); Fraser's Hill, *s.n.* in 1953 (K), *H.M. Burkill 2308* (A, K), *I.H. Burkill et R.E. Holttum s.n.* in 1922 (K), *E.J.H. Corner s.n.* in 1937 (A, BM, K), *C.W. Frack 1090* (L), *K.M. Kochummen s.n.* in 1973 (L), *J.W. Purseglove 4117* (K, L), *Syed Ali 23393* (K), *van Steenis 18538* (L); Summit Pine Hill, *H.M. Burkill, Md. Shah, et Md. Noor s.n.* in 1960 (K, L); Semangkok, *H.N. Ridley s.n.* in 1921 (K), *et 15645* (K). Trengganu: Gunang Padang, *L. Moysey et Kiah 31876* (K); Bati Pateh, *Wray 304* (E), *et 953* (BM).

Note. *A. cameronensis* Yang is possibly related to *A. perpendicularis* Walker because both have elongate subumbellate-paniculate inflorescences, but the former differs from the latter in having glaucous stems and leaves, more oblique lateral veins, round capitate hairs, and stout inflorescences.

For further reference, see the note following the description of *A. maingayi*.

16. **Ardisia metallica** N.E. Brown in Illustr. Hortic. **28**: 88. 1881; Mez in Engl., Pflanzenr. **9** (IV. 236): 151. 1902.

Ardisia cordulata Fletcher in Kew Bull. **1937**: 28. 1937 & in Kerr, Fl. Siam. Enum. **2**(4): 338. 1938. *syn. nov.*

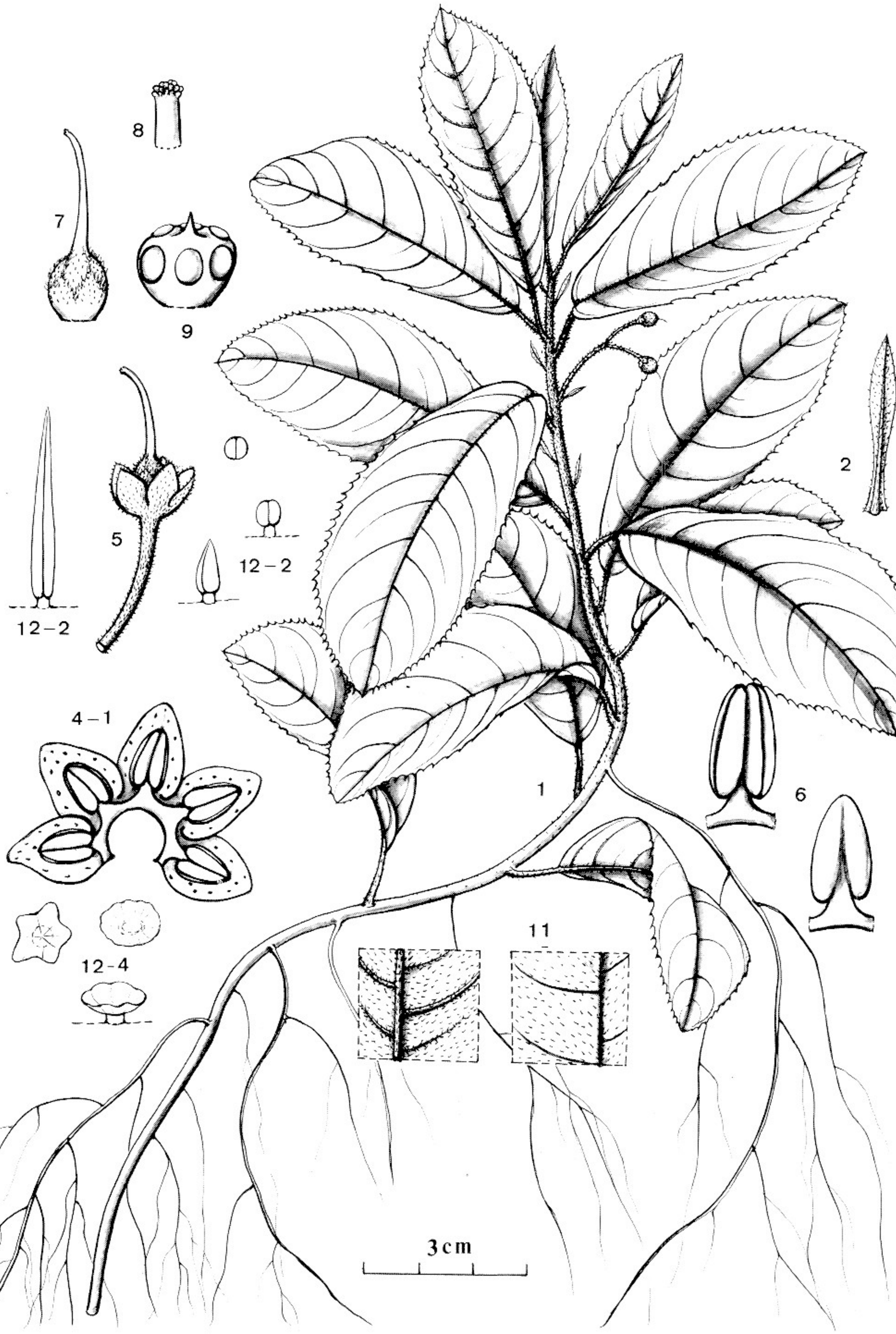

Fig. 58. *Ardisia metallica* (*Leenwen 7921*). 1. Habit; 2. Hypsophyll; 4-1. Petals and stamens; 5. Pedicel with calyx and a pistil; 6. Stamens; 7. Pistil; 8. Stigma; 9. Ovules on a placenta; 11. Magnified part of a leaf; 12-2. Elongate-bicellular-capitate hairs; 12-4. Round-peltate scales.

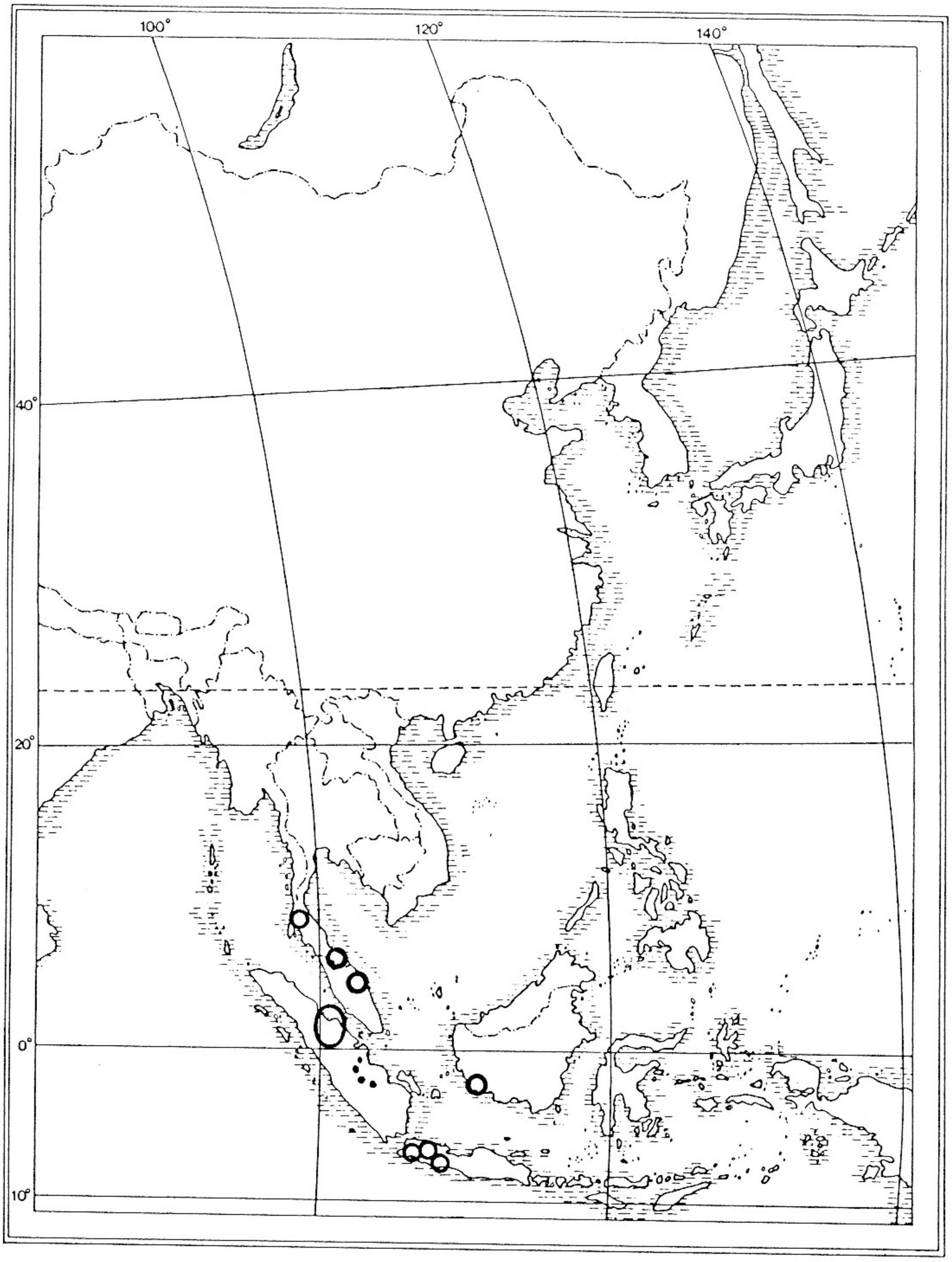

Fig. 59. Distribution of *Ardisia metallica*.

Ardisia cordulata Fletcher var. *patulo-hirsuta* Fletcher in Kew Bull. **1937**: 29. 1937 & in Kerr, Fl. Siam. Enum. **2**(4): 338. 1938. *syn. nov.*

Ardisia odontophylla sensu Mez in Engl., Pflanzenr. **9** (IV. 236): 150. 1902. pro parte; non Wall. *ex* A. DC.

Ardisia odontophylla sensu C. A. Backer, Fl. Java **2**: 196. 1965; non Wall. *ex* A. DC. **Fig. 58**

A small shrub up to 40 cm high with a creeping rhizome, pubescent with elongate-bicellular-capitate hairs on young vegetative parts and inflorescences; stems puberulous when young, nearly glabrous when mature; hypsophylls subcharataceous, deciduous, linear, ca. 6 mm long, seldom punctate, velutinous; leaves alternate or subverticillate, chartaceous, elliptic or obovate, 3–12.5 cm long, 1–5.5 cm wide, acute or obtuse or rounded at the apex, obtuse or acute at the base, serrate, velutinous above when young and glabrous when mature, velutinous and sometimes bullate beneath, the lateral veins 5–10 pairs, the midrib subplane above and raised beneath; petioles 0.5–2 cm long, velutinous. Inflorescences umbellate, or rarely umbellate-paniculate, axillary from hypsophylls and leaves, usually 3-flowered; peduncle short, less than 1.5 cm, puberulous or velutinous; sepals united near the base, the lobes ovate or triangular-ovate, 1–1.5 mm long, minutely ciliate, punctate; corolla-lobes pink, broad-ovate, 4–5 mm long, obtuse at the apex, punctate; stamens ovate, obtuse at the apex; ovary subglobose, minutely puberulous; ovules 5 in a whorl. Fruit globose, ca. 5 mm in diameter, red.

Typification. *Ardisia metallica* N. E. Brown is typified by the specimen, *Linden s. n.* May, 1981, collected in Sumatra and deposited at Kew Herbarium. Only two leaves are on the type sheet.

Distribution. Java, Sumatra, and Thailand. (Fig. 59).

Ecology. Collections were gathered in evergreen forests at 600–1500 meters.

Additional specimens examined. **JAVA**. Buitensorg, *D. v. Leenwen 7921* (BM); Lunviliang en Buitensorg, *Bakh v/d Brink 6398* (BM, UC); Nangils ten hw, v. Buitensorg, *van Steenis 2757* (L); Paniisan, *Bakh v/d Brink 6187* (L); Pelabuan, *A. H. G. Alston 12984* (BM); Tjipoedi bij Tjiampea, *Bakh v/d Brink 4182* (L); West Java, *H. O. Forbes 475* (BM); no further locality, *Zollinger 3509* (BM). **MALAYSIA**. Trengganu: 38th m. Trengganu-Besut Rd., *J. Sinclair et Kiah b. Salleh 39958* (K, L). **THAILAND**. Nakhon: Khao Luang Area, *C. F. V. Beusekom and C. Phenghhlai 816* (K, L); Ranong: Khlong Kam Puan, *R. Geesink and Santisuk 5105* (L). Pattani: Betong, *Kerr 7902* (K, holotype of *A. cordulata* Fletcher); Puket, *A. F. G. Kerr 19200* (E, K, types of *A. cordulata* Fletcher var. *patulo-hirsuta* Fletcher).

Note. *Ardisia odontophylla*, with which this species has often been confused, has longer racemose or racemose-paniculate inflorescences, larger leaves with more than ten pairs of lateral veins, and taller and more erect stems.

17. **Ardisia odontophylla** Wall. *ex* A. DC. in Trans. Linn. Soc. **17**: 125. t. 6. 1834 & in DC., Prodr. **8**: 135. 1844. sensu stricto; Clarke in Fl. Br. Ind. **3**: 525. 1882; Mez in Pflanzenr. **9** (IV. 236): 150. 1902. pro parte; N. P. Balakrishman, Fl. Jowai Vicinity Meghalaya **1**: 291. 1981.

Ardisia pavonina Buch Hamilt. *ex* & fide A. DC. in Trans. Linn. Soc. **17**: 125. 1834.

Tinus odontophylla (A. DC.) Kuntze, Rev. Gen. **2**: 974. 1891. **Fig. 60**

A small shrub, 0.6–2 m high, pubescent with elongate-bicellular-capitate hairs

Fig. 60. *Ardisia odontophylla* (*CSS 3194*). 1. Habit; 2. Hypsophyll; 4. Floral bud; 4-1. Petals and stamens; 5. Pedicel with calyx and a pistil; 6. Stamens; 7. Pistil; 8. Stigma; 9. Ovules on a placenta; 10. Fruit; 12-2. Elongate-bicellular-capitate hairs.

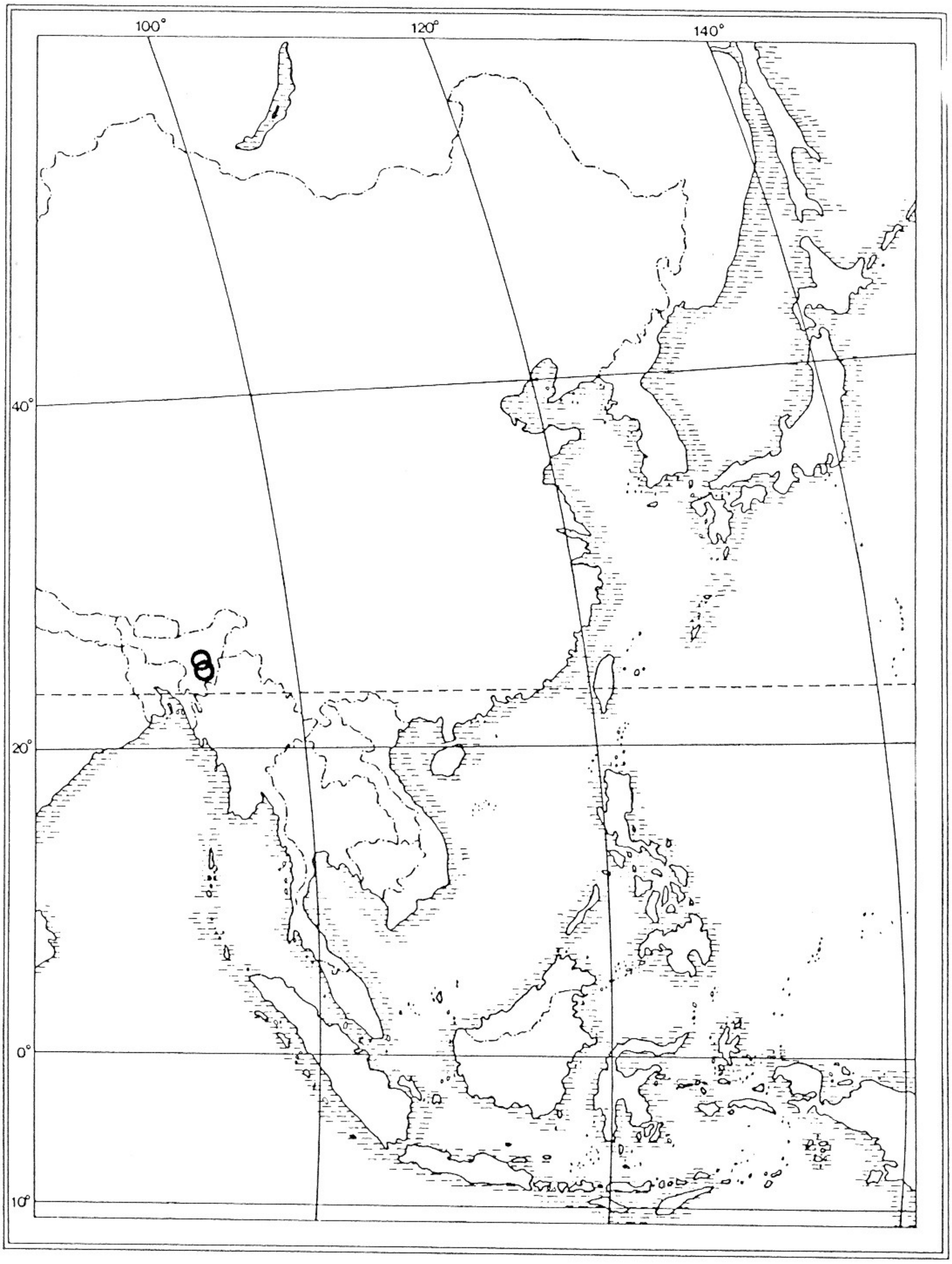

Fig. 61. Distribution of *Ardisia odontophylla*.

on young vegetative parts and inflorescences; stems erect, puberulous or villose when young, nearly glabrous when mature; hypsophylls chartaceous, narrowly oblanceolate, 0.6–1.7 cm long, minutely puberulous; leaves subverticillate, chartaceous, elliptic or obovate, 8–19 cm long, 3–8 cm wide, acuminate or acute at the apex, obtuse at the base, serrulate, slightly puberulous above when young, glabrous when mature, puberulous on veins beneath, punctate with scattered brownish-orange dots, the dots mostly near the margins, the midrib subplane or slightly canaliculate above, raised beneath, the lateral veins 11–17 pairs, subplane above, raised beneath; petioles canaliculate above, 2–7.5 cm long, puberulous. Inflorescences racemose or racemose-paniculate, axillary from hypsophylls or leaves, 3–9 cm long; peduncles 1–3 cm long, puberulous; bracteoles linear, ca. 4 mm long; pedicels 5–10 mm long, minutely puberulous; sepals united 1/3–1/4 their length, the lobes mostly ovate, ca. 1.3 mm long, 0.7 mm wide, obtuse or slightly acute at the apex, minutely puberulous outside, not punctate; corolla-lobes pink, ovate, ca. 3 mm long, 1.4 mm wide, acuminate at the apex; anthers ovate, obtuse at the apex; ovary subglobose, minutely puberulous; styles minutely velutinous or glabrate on the lower part; ovules ca. 5 in a whorl. Fruit globose, ca. 6 mm in diameter, scarlet-red.

Typification. The holotype of *A. odontophylla* Wall. *ex* A. DC. is Wall. Cat. *2279*, deposited at the Kew Herbarium. An isotype is at the Herbarium of British Museum, London.

Distribution. India and Burma. (Fig. 61).

Ecology. Several specimens were reported as being collected at 3000 feet at Kahsia, Assam; the collections from Burma were gathered at 4000 feet. According to N.P. Balakrishman (1981), the plants grow in primary forests at 1200–1800 m. They flower and fruit from June to February.

Additional specimens examined. **BURMA**. No further locality, *Griffith 3566* (K). **INDIA**. Cachar, *C.B. Clarke 42391B* (BM), *et 42393* (BM); Iuwai, *J.D. Hooker et T. Thomson 2415*; Umwai Khasia, *C.B. Clarke 15644* (K), *et 19405B* (BM), *J.D. Hooker et T. Thomson s.n.* (GH, K, L), *Wallich Cat. 2279B* (K); no further locality, *King's Collector s.n.* no date (K).

Note. A much more restricted concept of *Ardisia odontophylla* is proposed here in contrast to the views of other authors (Backer, 1965; Stone, unpublished), whose treatments include *A. odontophylla* var. *lobbii* Clarke (=*A. maingayi*) and *Ardisia metallica* N.E. Brown. As treated here, *A. odontophylla* occurs almost exclusive in Assam, India and Burma. More specimens are needed for further study to understand their presumed relationship to *Ardisia maingayi* (Clarke) King & Gamble and *Ardisia metallica* R.E. Brown.

18. **Ardisia perpendicularis** Walker in Lingnan Sci. Journ. **20**: 191. f. 4. 1942.

Ardisia botryosa sensu C. Chen in Agend. Academ. Sinic., Fl. Reipubl. Popul. Sinic. **58**: 94. f. 15, 1–5. 1979. pro parte; non Walker. **Fig. 62**

A small shrub up to 70 cm high with a creeping rhizome, pubescent with elongate-bicellular-capitate hairs on young vegetative parts and inflorescences; stems puberulous when young, glabrous when mature, 6–7 mm in diameter; hysophylls unknown; leaves subverticillate, chartaceous, elliptic or obovate, 16–26 cm long, 6.5–11 cm wide, acuminate at the apex, decurrent to the base, serrulate, glabrous or slightly puberulous on the veins above, puberulous beneath, densely

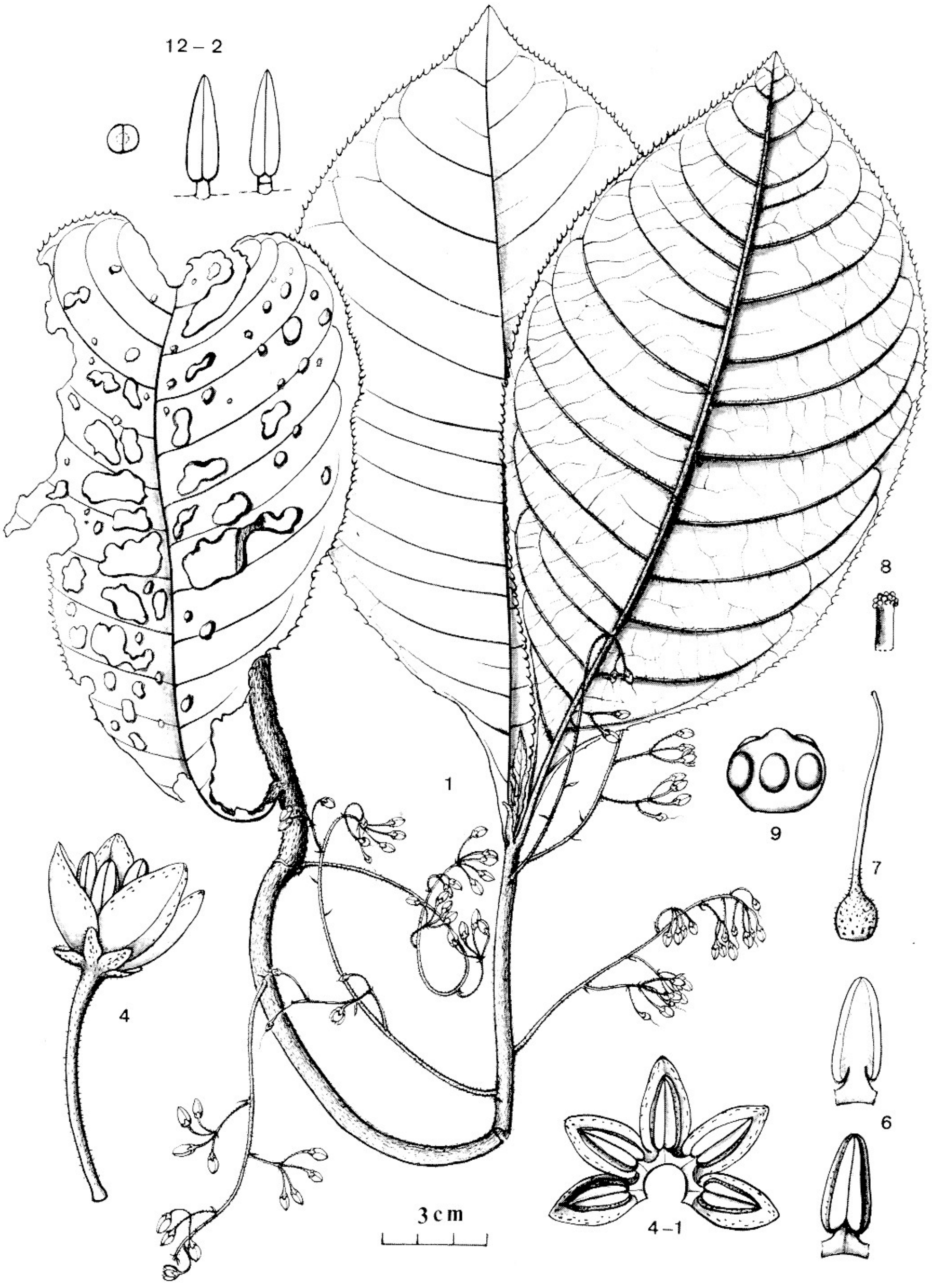

Fig. 62. *Ardisia perpendicularis* (*Petelot 5090*). 1. Habit; 4. Flower; 4-1. Petals and stamens; 7. Pistil; 8. Stigma; 9. Ovules on a placenta; 12-2. Elongate-bicellular -capitate hairs.

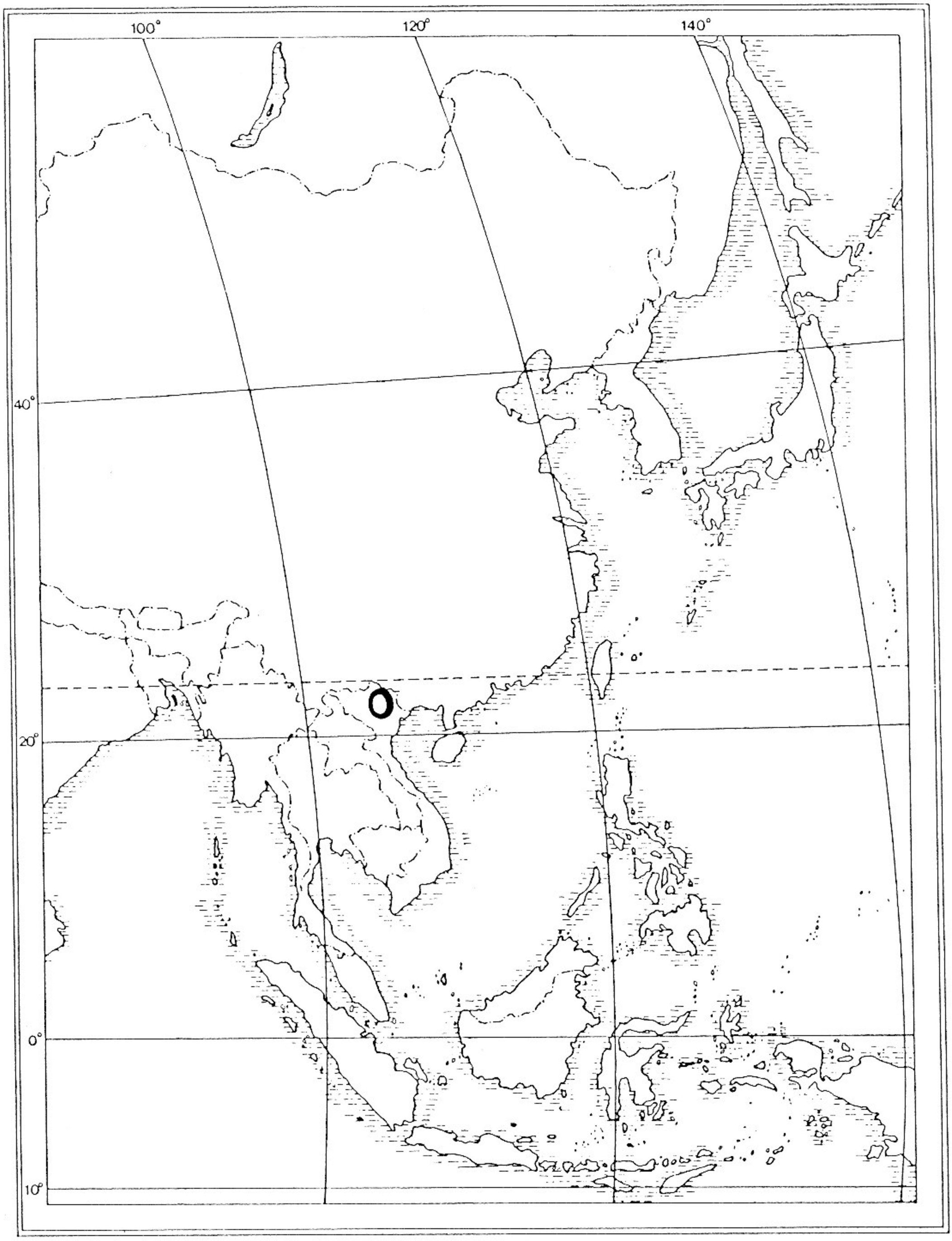

Fig. 63. Distribution of *Ardisia perpendicularis.*

minutely punctate, the midrib subplane or slightly canaliculate above, conspicuously raised beneath, the lateral veins 15–22 pairs, slightly canaliculate above, raised beneath, the veinlets raised beneath; petioles winged. Inflorescences umbellate-paniculate, slightly puberulous, axillary from hypsophylls and leaves, 8–11 cm long; bracteoles linear, ca. 2.5 mm long, slightly puberulous; rachis 1–3.5 cm long; pedicels 7–8 mm long; sepals united 1/4–1/5 their length, the lobes ovate or linear-ovate, 1–1.5 mm long, obtuse or slightly acute at the apex, somewhat puberulous, punctate, ciliate; corolla-lobes ovate, ca. 4 mm long, acute at the apex, punctate along the margin; ovary subglobose, puberulous, punctate; anthers long-ovate, obtuse at the apex; ovules ca. 5 in a whorl. Fruit globose, ca. 7 mm in diameter.

Typification. The species is typified by *A. Petelot 5090*, collected at Chapa, Tonkin, Vietnam. The holotype is deposited in the United States National Herbarium, Washington. The isotype, deposited at Pairs, was examined.

Distribution. Chapa and Mt. Bavi, Tonkin, Vietnam, are the only known localities. (Fig. 63).

Ecology. The collections were gathered at 1200 to 1900 meters. Flowering specimens were collected in June through November.

Additional specimens examined. **VIETNAM**. Tonkin: Chapa, *A. Petelot 6473* (US), *8688* (US, 2 sheets); Mt. Bavi., *A. Petelot 7146* (MO).

Note. According to Walker (1942), *A. perpendicularis* is closely related to *A. replicata* Walker which has long petioles about 2–6 cm in length, leaves less than 16 cm long, and shorter inflorescences. However, this species is possibly more closely related to *A. botryosa* Walker than to *A. replicata* because of the similarity in leaf shape and in the petioles being winged. *A. perpendicularis* differs from *A. botryosa* in having leaves with more pairs of lateral veins and being acuminate at the apex. *A. perpendicularis* is a much taller plant.

19. **Ardisia pingbienensis** Yang, *nom. nov.*

Ardisia longipedunculata C. Y. Wu & C. Chen in Fl. Yunnanica 1: 361. 1977; C. Chen in Agend. Academ. Sinic., Fl. Reipubl. Popul. Sinic. **58**: 98. 1979; non King & Gamble.

A small shrub with a thick rhizome; stems densely velutinous when young, glabrous at maturity; leaves chartaceous, broad-elliptic, 15–18 cm long, 7.5–8.5 cm wide, acute at the apex, cuneate or nearly rounded at the base, serrulate-fimbriate, slightly glandular-punctate along the margins, glabrous or pubescent on midrib above, densely puberulous especially on veins beneath, the lateral veins ca. 28 pairs, perpendicular to the midrib; petioles densely puberulous, 3.5–7.5 cm long. Inflorescences subumbellate-paniculate, axillary from leaves or hypsophylls, 5.5–7.5 cm long; pedicels 3–8 mm long, puberulous; sepals united near the base, the lobes ovate, acuminate at the apex, ca. 2 mm long, puberulous outside, slightly ciliate, glandular-punctate; corolla-lobes pink, broad-ovate, obtuse at the apex, glabrous, glandular-punctate; stamens shorter than petals; anthers ovate or broad-lanceolate, punctate with glandular dots on back or not; pistil as long as the petals; ovary densely puberulous. Fruit unknown.

Typfication. The species is typified by *C. S. Yang 600430* (YUKU) collected in Pingbien in 1959. Only photos were examined.

Distribution. Pingbien, Yunnan, China, is the only known locality. (Fig. 64).

Additional specimens not available.

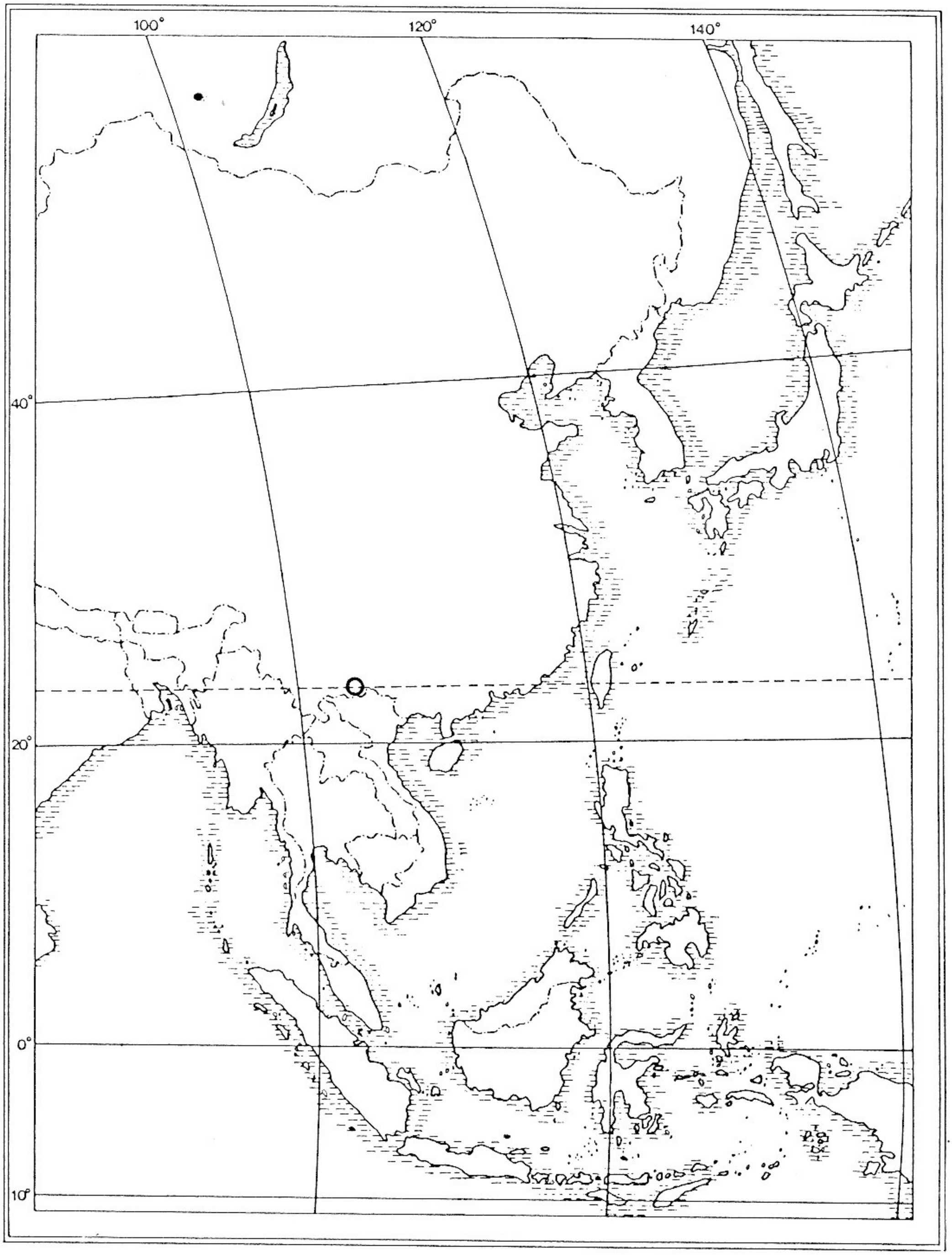

Fig. 64. Distribution of *Ardisia pingbienensis.*

Ecology. Flowering specimens were collected in forests at 900 to 1000 meters in May.

Note. This description is a translation of Chen's in *Flora of Yunnanica*, Vol. 1, p. 361. 1979. In his illustration, the species is shown as being pubescent with elongate-bicellular-capitate hairs on the young vegetative parts as well as inflorescences.

The specific epithet of the species described initially by Wu and Chen is very similar to that of *Ardisia longepedunculata* King & Gamble published in 1906. In treating Wu and Chen's *A. longipedunculata* as a later homonym and in renaming the taxon, *A. pingbienensis*, I am following the Article 64.2 of International Code of Botanical Nomenclature in 1983.

Except for a photo of the type specimen, there were no specimens available for examination. I accepted Wu and Chen's description in *Flora Reipublicae Popularis Sinicae* in 1979 and translated the same for this revisionary work. *A. longipedunculata* Wu & Chen (=*A. pingbienensis*) is certainly acceptable as a distinct species because it has long petioles and many lateral veins perpendicular to the midrib of leaves. I assume that are not found in any other species of *Ardisia*.

According to Chen, the species is closely related to *A. scalarinervis* Walker, but differs in having elliptic leaves and umbellate-paniculate inflorescences.

20. **Ardisia ramondiaeformis** Pitard in Lecomte, Fl. Gen. Indochine 3: 812. 1930.

Fig. 65

A small shrub with a thick rhizome ca. 1 cm in diameter, pubescent with elongate-bicellular-capitate hairs on young vegetative parts and inflorescences; stems short, puberulous to tomentose when young, nearly glabrous when mature; hypsophylls linear, 8-28 mm long, nearly glabrous above, tomentose beneath, punctate; leaves subverticillate or alternate or tufted at upper shoot, oblanceolate or obovate or elliptic, 11-25 cm long, 3.5-9 cm wide, acute at the apex, acute or attenuate at the base, serrulate, nearly glabrous or puberulous on midrib above, tomentose beneath especially on the veins, conspicuously punctate along the margins and minutely densely punctate on the lobes, the lateral veins 11-24 pairs, plane above and raised beneath, the midrib subplane above and conspicuously raised beneath; petioles dimorphic, winged when plants at maturity, but unwinged and (2)3-7.7 cm long when in young plants, densely puberulous to tomentose. Inflorescences racemose or rarely subumbellate-paniculate, 12-17 cm long (mature); bracteoles linear, 2-4 mm long, puberulous; pedicels ca. 1 cm long, densely puberulous; calyx-lobes ovate, ca. 2 mm long, obtuse at the apex, puberulous beneath, densely black-punctate, minutely ciliate; corolla-lobes narrowly ovate, ca. 5 mm long, obtuse at the apex, conspicuously punctate; stamens ovate, the anthers ca. 3.5 mm long, mucronate at the apex; ovary subglobose, puberulous at upper part; ovules 5-6 in a whorl. Fruit globose, red, 8-9 mm in diameter.

Typification. This species was typified by the specimens collected by B. Balansa at Mt. Bavi, Tonkin, Vietnam. Pitard, who described the species as new, did not give the collection number. However, as 2 specimens of *B. Balansa 3946*, deposited at Paris, match the original description, the collections are presumably the type of *A. ramondiaeformis*. The one with flowers is here designated as the lectotype, the other the isolectotype.

Distribution. Only Mt. Bavi, Tonkin, Vietnam, is the known locality. (Fig. 66).

Fig. 65. *Ardisia ramondiaeformis* (*Balansa 3946*). 1. Habit; 3. Hypsophyll; 4. Floral bud; 4-1. Petals and stamens; 5. Pedicel with calyx and a pistil; 6. Stamens; 7. Pistil; 8. Stigma; 9. Ovules on a placenta; 12-2. Elongate-bicellular-capitate hairs.

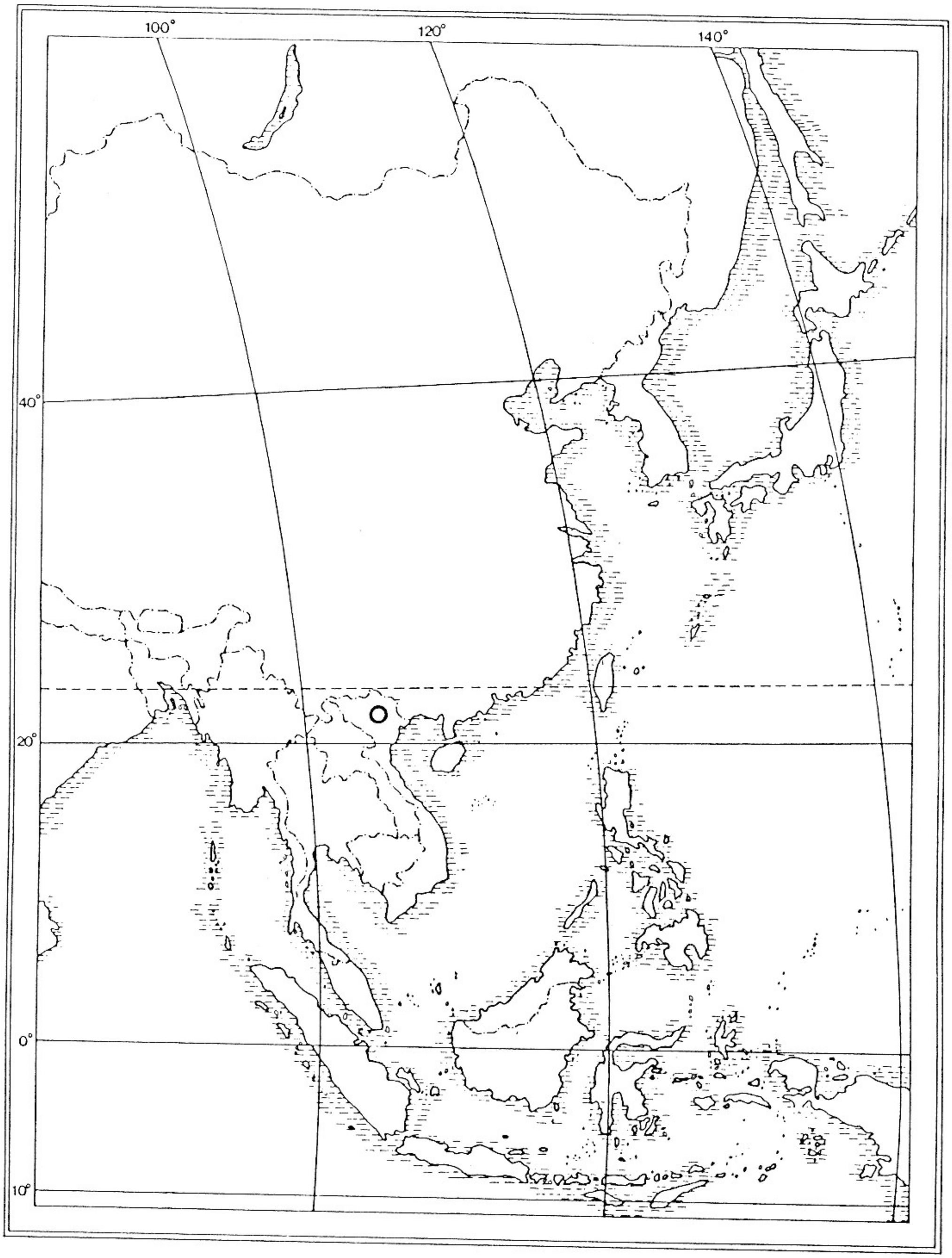

Fig. 66. Distribution of *Ardisia ramondiaeformis*.

Ecology. Plants grow in forests at 700-1000 meters. Flowering specimens were collected in June, fruiting specimens in January and February.

Additional specimens examined. **VIETNAM**: Mt. Bavi, Son-tay, Tonkin, *Pitard 7123* (MO), et *Chung-yueh-kao-chia-tuei 1243* (KUN).

Note. *Ardisia ramondiaeformis* is similar to *A. silvestris* Pitard in leaf shape. However, the former differs from the latter in a few characters, especially the inflorescences being racemose and 12-17 cm long, petioles (2)3-7.7 cm long, and calyx-lobes dense blackish punctate.

21. **Ardisia replicata** Walker in Bull. Fan. Mem. Inst. Biol. Bot. **9**: 169. 1939 & in Philipp. Journ. Sci. Bot. **73**: 144. fig. 30. 1940; C. Y. Wu & C. Chen, Fl. Yunnanica **1**: 360. pl. 85, fig. 6-7. 1977; C. Chen in Agend. Academ. Sinic., Fl. Reipubl. Popul. Sinic. **58**: 95. 1979.

Ardisia pubivenula Walker in Philipp. Journ. Sci. Bot. **73**: 146. fig. 31. 1940; Anonymous, Fl. Hainanica **3**: 175. 1974; C. Chen in Agend. Academ. Sinic., Fl. Reipubl. Popul. Sinic. **58**: 96. 1979. syn. nov. **Fig. 67**

A small shrub with a creeping rhizome, pubescent with elongate-bicellular-capitate hairs on young vegetative parts and inflorescences; stems erect, up to 40 cm high, unbranched, densely puberulous or tomentose; hypsophylls linear-oblanceolate; leaves alternate or subopposite, chartaceous, ovate or elliptic-ovate or obovate, 7.5-17 cm long, 4-10 cm wide, acute or acuminate at the apex, rounded or slightly obliquely cordate at the base, minutely serrulate, puberulous above when young, glabrous and wrinkled when mature, minutely puberulous beneath, the midrib canaliculate above, conspicuously raised beneath, the lateral veins 8-16 pairs, subplane or canaliculate above, raised beneath; petioles 2.5-10 cm long, tomentose or puberulous, not winged or slightly so at the upper part. Inflorescences racemose or racemose-paniculate, axillary from hypsophylls or leaves, 3-7 cm long; peduncle velutinous or puberulous; pedicels 0.6-1 cm long; flowers pale pink; calyx-lobes elliptic-ovate or ovate, 1-1.5 cm long, acute or obtuse at the apex, somewhat punctate, minutely ciliate, glabrous or puberulous outside; corolla-lobes ovate, acute or obtuse, punctate with small reddish black dots; stamens ca. 2/3 length of petals; anthers oblong, apiculate, not punctate on back; pistil ca. equaling petals; ovary ovoid, velutinous; ovules ca. 7 in a whorl. Fruit globose, ca. 6 mm in diameter, bright red, minutely puberulous, not punctate or nearly so.

Typification. This species is typified by the specimen, *Henry 11444*, collected at Mentze, Yunnan, China. The holotype is at the Herbarium of New York Botanical Garden. Isotype is at Kew Herbarium.

Distribution. Vietnam and China. (Fig. 68).

Ecology. Plants are in dense forests or ravines at 700 to 1400 meters. Fruiting specimens were gathered in July through December, flowering specimens in May.

Additional specimens examined. **CHINA**. Kwangtung: Hainan, *F. C. How 73665* (US, holo- and isotypes of *A. pubivenula* Walker). Kwangsi: Tamienshan, Shiwantashan, *H. Y. Liang 69643* (MO). Yunnan: Fooning, *C. W. Wang 89674* (KUN, photo). **VIETNAM**. Tonkin: Laokay, *Chung-yueh-kao-chia-tuei 656* (KUN, photo).

Note. The plants collected in Hainan were recognized by Walker as a separate species, *A. pubivenula*. He indicated that *A. pubivenula* differs from *A. replicata* in its shorter stems and rugose leaves with few lateral veins, not united to form a definite marginal vein. However, these characters are quite variable in the species

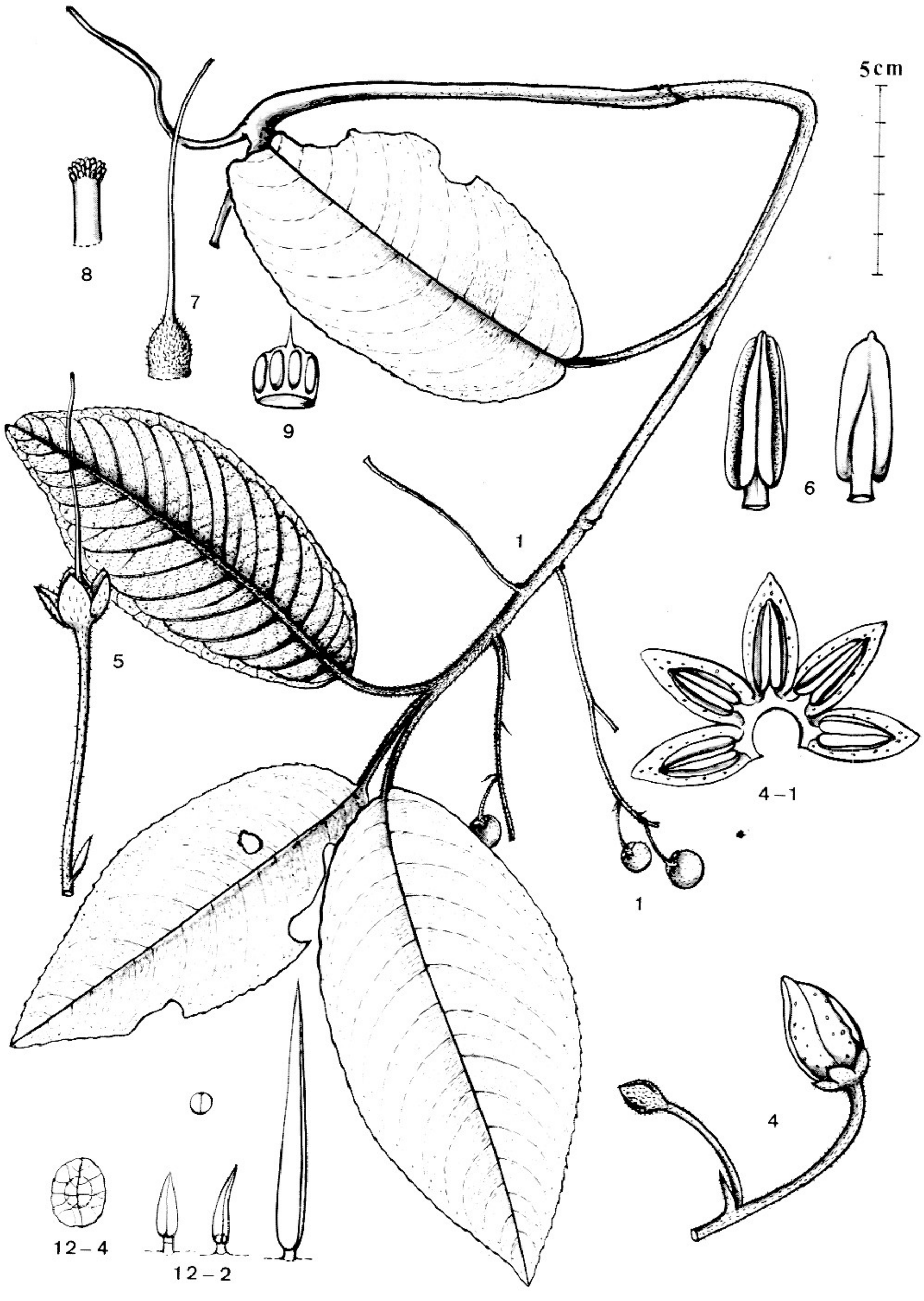

Fig. 67. *Ardisia replicata* (*Tsai 60906*). 1. Habit; 4. Floral bud; 4-1. Petals and stamens; 5. Pedicel with calyx and a pistil; 6. Stamens; 7. Pistil; 8. Stigma; 9. Ovules on a placenta; 12-2. Elongate-bicellular-capitate hairs; 12-4. Round-peltate scales.

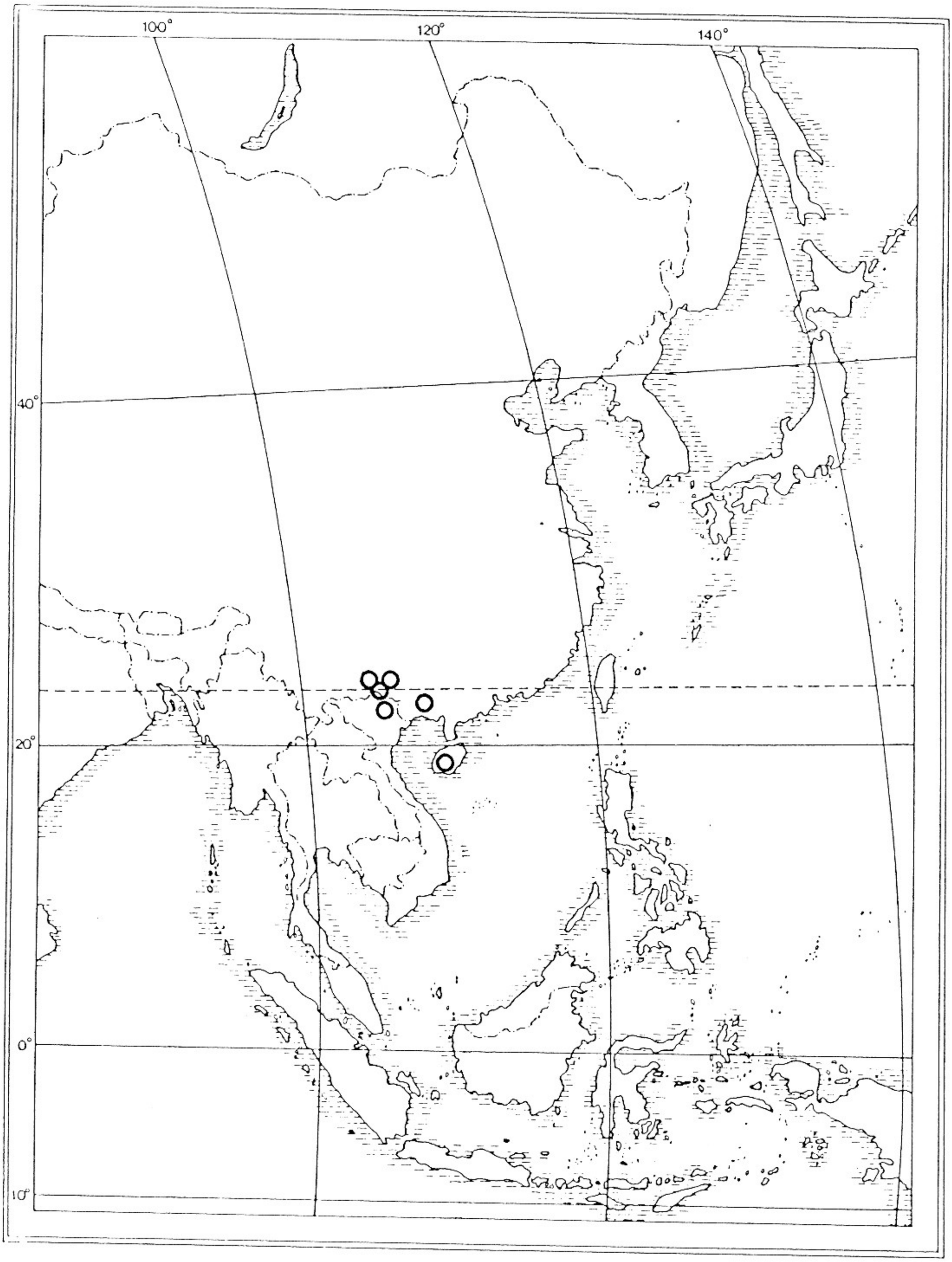

Fig. 68. Distribution of *Ardisia replicata*.

of this subgenus. Additionally, a few specimens showed some characters intermediate between these two species. According to Walker, *A. replicata* has leaves with about 15 pairs of lateral veins, *A. pubivenula* with about 8 (-10-13) pairs. In studying material of both species I observed that the lateral veins vary from 10 to 16 in *A. replicata*, and from 8 to 13 in *A. pubivenula*. Furthermore, according to Walker, the length of the petioles of *A. pubivenula* was described as 2-4 cm, and that of *A. replicata* 2-5 cm. In the specimens examined. the petioles varied from 2 to 6 cm in *A. pubivenula*.

In 1979, Chen distinguished *A. replicata* from *A. pubivenula* by its longer inflorescences, 3-5 cm long. However, in the specimens of *A. pubivenula* examined, the length of inflorescences vary from 2 to 5 cm. On the basis of the facts mentioned above, I am treating *A. pubivenula* as a synonym of *A. replicata*.

22. **Ardisia scalarinervis** Walker in Journ. Wash. Ac. Sci. **21**(19): 477. fig. 1. 1931, & in Bull. Fan. Mem. Inst. Biol. Bot. **9**: 168. fig. 20. 1939, & in Philipp. Journ. Sci. Bot. **73**: 140. fig. 28. 1940; C. Y. Wu & C. Chen Fl. Yunnanica **1**: 360. pl. 85. fig. 8. 1977; C. Chen in Agend. Academ. Sinic., Fl. Reipubl. Popul. Sinic. **58**: 96. 1979.

Ardisia odontophylla sensu Dunn in Journ. Linn. Soc. Bot. **39**: 419. 1911; non Wall. *ex* A. DC. **Fig. 69**

A small shrub up to 80 cm high with a creeping rhizome, pubescent with elongate-bicellular-capitate hairs on young vegetative parts and inflorescences; stems densely fuscous-tomentose when young, glabrate when mature; hypsophylls narrowly suboblanceolate, 1.1-1.8 cm long, acuminate at the apex, glabrous above, tomentose beneath, minutely punctate; leaves usually subverticillate, obovate, 18.5-26 cm long, 4.2-8.7 cm wide, acuminate or acute at the apex, obtuse or rounded at the base, minutely serrulate, glabrous above, tomentose along the midrib beneath, scattered-punctate along the margins, the lateral veins 28-45 pairs, perpendicular to the midrib, slightly raised above and raised beneath, the midrib canaliculate and puberulous above, conspicuously raised beneath; petioles 2-3.5 cm long, fuscous-tomentose. Inflorescences umbellate, axillary from hypsophylls or leaves; peduncles short, ca. 0.5 cm long, fuscous-tomentose; bracteoles linear, 2-4 mm long, puberulous; pedicels 0.7-1.7 cm long, puberulous; sepals united 1/3-1/5 their length, the lobes triangularly ovate, 2-3 mm long, acuminate at the apex, puberulous outside, minutely ciliate, seldom punctate; corolla-lobes ovate, ca. 5 mm long, acute at the apex, minutely punctate at the uppermost part; anthers ca. 2.8 mm long, ovate, mucronate at the apex; ovary ovate, puberulous; ovules ca. 5 in a whorl. Fruit globose, 5-7 mm in diameter, red or blackish red, pubescent.

Typification. The holotype is *A. Henry 12021* (US) collected at Szemao, Yunnan, Mainland China. The isotype is at Gray Herbarium of Harvard University and Kew Herbarium.

Distribution. Yunnan, China. (Fig. 70).

Ecology. The plants grow in the broad-leaved forests at 1500 to 1600 meters.

Additional specimens examined. **CHINA**. Yunnan: Szemao, *A. Henry 12021* (A), *12021B* (E, MO).

Note. This species is distinctly different from other species in having the inflorescences sessile or subsessile, the leaves with many lateral veins perpendicular to midrib, and the stems and petioles tomentose when young. According to Chen

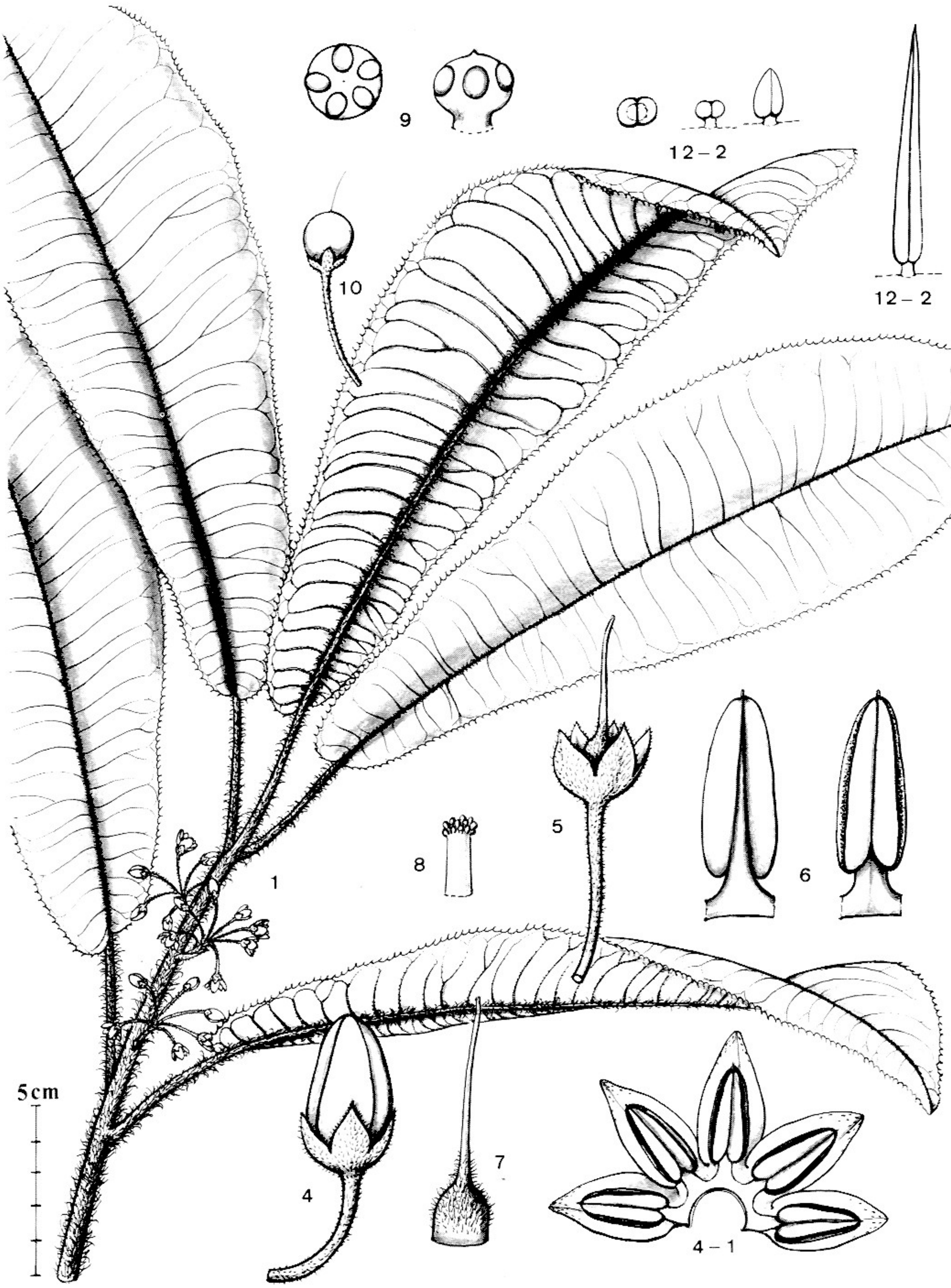

Fig. 69. *Ardisia scalarinervis* (*Henry 12021A*). 1. Habit; 4. Floral bud; 5. Pedicel with calyx and a pistil; 6. Stamens; 7. Pistil; 8. Stigma; 9. Ovules on a placenta; 10. Fruit; 12-2. Elongate-bicellular-capitate hairs.

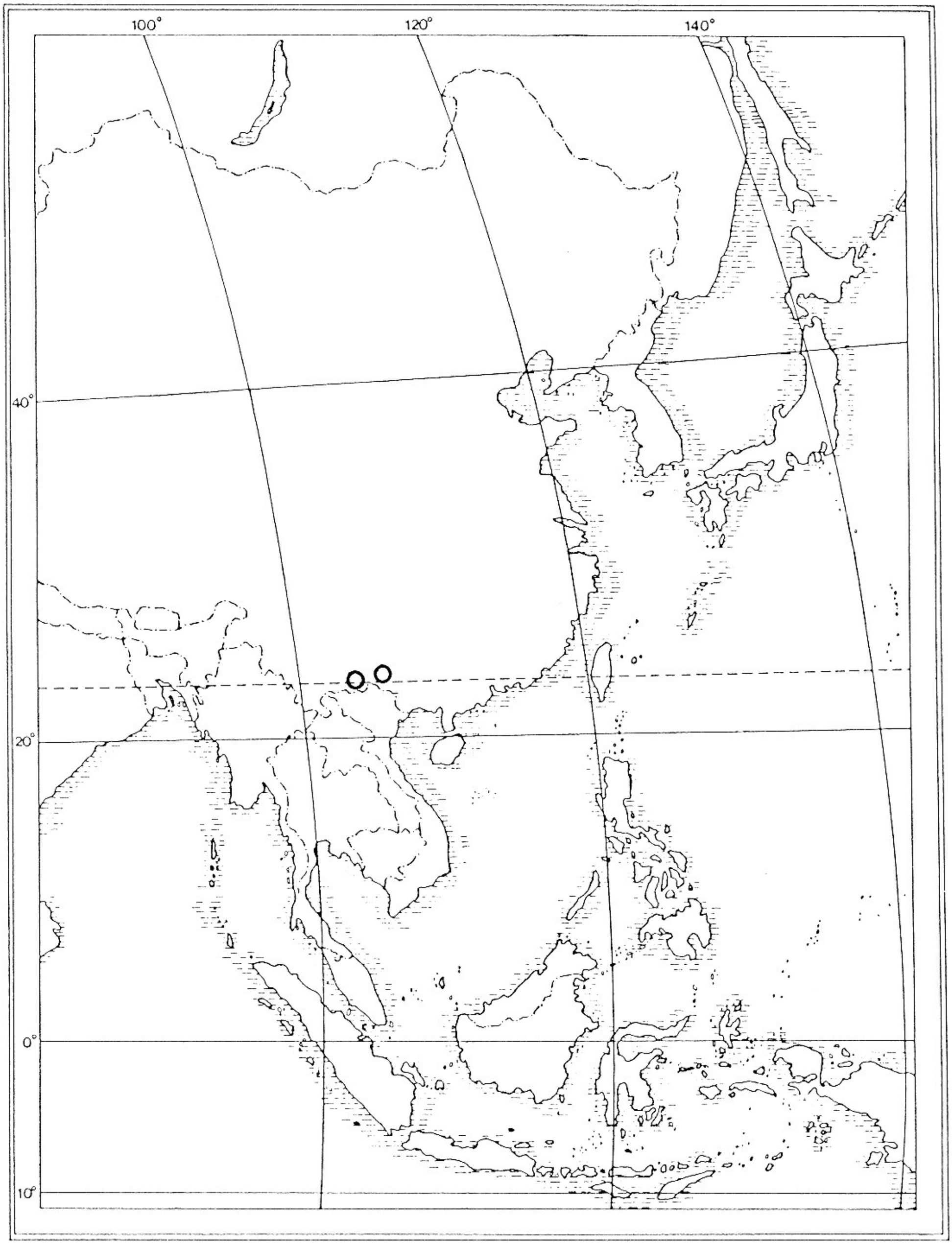

Fig. 70. Distribution of *Ardisia scarlarinervis*.

(1977), this species is closely related to *Ardisia longipedunculata* Chen (=*A. pingbienensis* Yang). However, the latter is distinguished by its pedunculate inflorescence as well as elliptic leaves.

23. **Ardisia silvestris** Pitard in Lecomte, Fl. Gen. Indoch. **3**: 816. 1930; Walker in Philipp. Journ. Sci. Bot. **73**: 142. fig. 29. 1940; Anonymous, Fl. Hainan. **3**: 174; C. Chen in Agend. Academ. Sinic., Fl. Reipubl. Popul. Sinic. **58**: 94. 1979.

Ardisia odontophylla sensu H. R. Fletcher in Kerr, Fl. Siam Enum. **2**(4): 346. 1938; non Wall. *ex* A. DC.

Ardisia dasyrhizomatica C. Y. Wu & C. Chen, Fl. Yunnanica **1**: 358. fig. 84. 5-7. 1977; C. Chen in Agend. Academ. Sinic., Fl. Reipubl. Popul. Sinic. **58**: 93. pl. 14. fig. 5-7. 1979. **Fig. 71**

A small shrub up to 50 cm high, pubescent with elongate-bicellular-capitate hairs on young or rarely mature vegetative parts and inflorescences; stems ca. 1 cm in diameter, sericeous when young, glabrous when mature, the leaf scars prominent; hypsophylls chartaceous, reniform, long cuspidate at the apex, 1.5-2.2 cm long, 0.5-0.8 cm wide, slightly sericeous, minutely punctate, the midvein conspicuous; leaves mostly crowded at stem tips, occasionally in 2 to 3 verticels, oblanceolate or linear-obovate or obovate or elliptic, 17-30 cm long, 5-11 cm wide, acute at the apex, decurrent to the base, serrulate, slightly sericeous or glabrous above, sericeous beneath, densely minutely punctate, the lateral veins 16-32 pairs, subplane above and conspicuously raised beneath. Inflorescences umbellate-paniculate, axillary from hypsophylls, 5-11 cm long, slightly sericeous; rachis short, 1-3 mm long; bracteoles linear, 8-10 mm long, minutely punctate; pedicels 6-8 mm long, sericeous; sepals united up to 1/3 their length, the lobes triangular-ovate to ovate, ca. 1.5 mm long, punctate along the midvein; corolla-lobes pink, ovate, 4.5-5 mm long, obtuse at the apex; anthers ovate, obtuse at the apex; ovary subglobose, velutinous; ovules 5-7 in a whorl. Fruit globose, ca. 7 mm in diameter.

Typification. Pitard in 1930 described *A. silvestris* from several collections. The most possible representative of which is *Balansa 3941* (P). This is designated as the lectotype.

Distribution. Thailand, Vietnam, and Mainland China. (Fig. 72).

Ecology. Plants grow in forests at 400 to 1100 meters.

Additional specimens examined. **THAILAND**. Chantaburi: Kao Kuap, *Put 2974* (E). **VIETNAM**. Tonkin: Lao-kay, *Petelot 8688* (US, 2 sheets); Mt. Bavi, *B. Balansa 3940* (P), *Petelot 7120* (US), *7146* (US), Anonymous *s. n.* (L); Ninh-binh, *Bon s. n.* (P). Annam: Thua-thien, *Eberhardt 3095* (P). **CHINA**. Hainan: *F. C. How 72037* (GH, US); no further locality, *H. W. Li s. n.* (KUNM).

Note. *Ardisia silvestris* is related to *A. ramondiaeformis* Pitard, but differs in having a dense vesture, subumbellate-racemose inflorescence, and densely blackish-punctate calyx-lobes.

In 1977, Wu and Chen described a species *A. darsyrhizomatica*, mainly characterized by the very short rachis of its inflorescence. Although no type collections were examined for comparison, the excellent drawing accompanying the original description provides sufficient evidence to include it under *A. silvestris*.

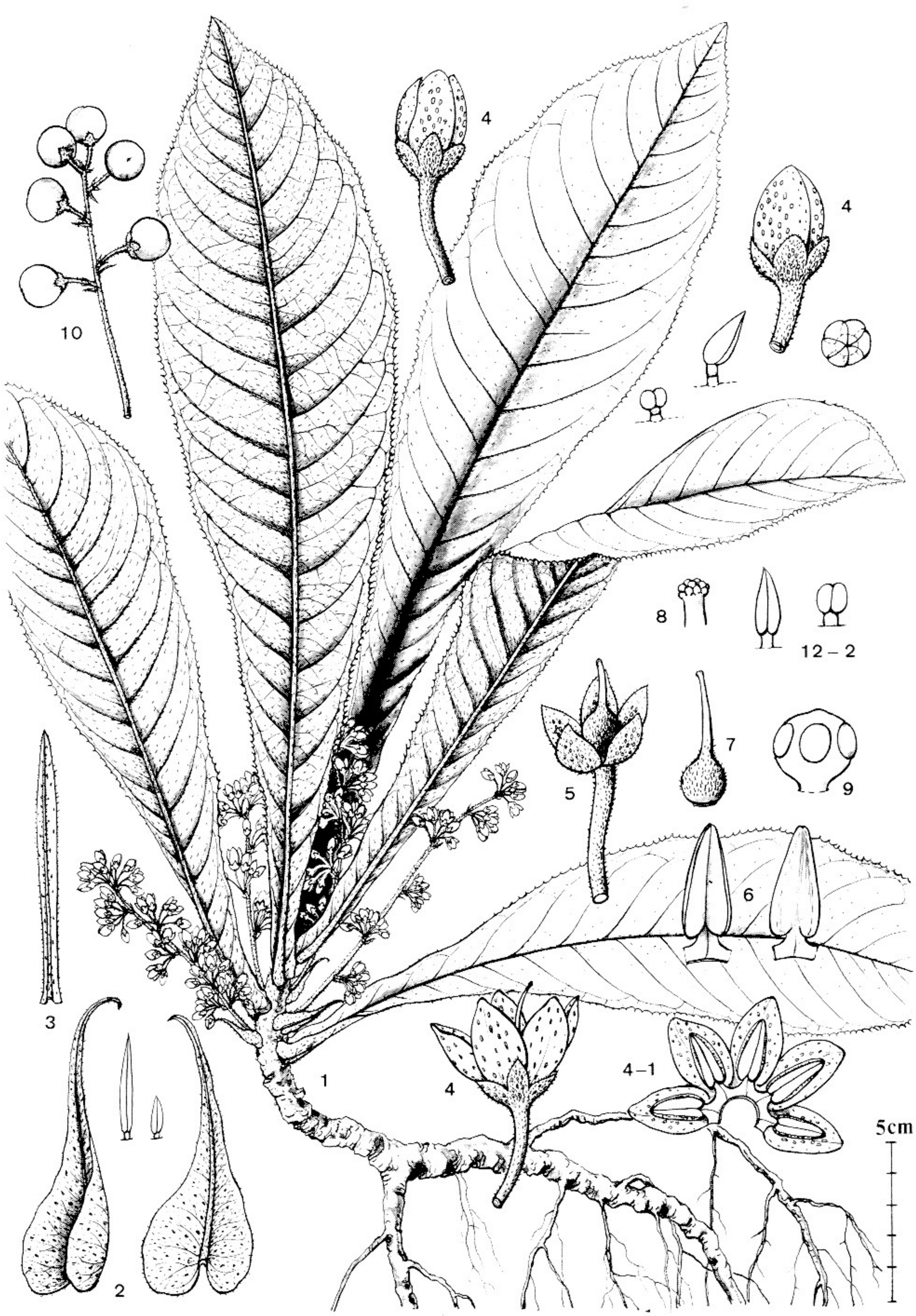

Fig. 71. *Ardisia silvestris* (*Petelot 7120*). 1. Habit; 2. Hypsophylls; 3. Bracteole; 4. Floral bud; 5. Pedicel with calyx and a pistil; 6. Stamens; 7. Pistil; 8. Stigma; 9. Ovules on a placenta; 10. Fruit; 12-2. Elongate-bicellular-capitate hairs.

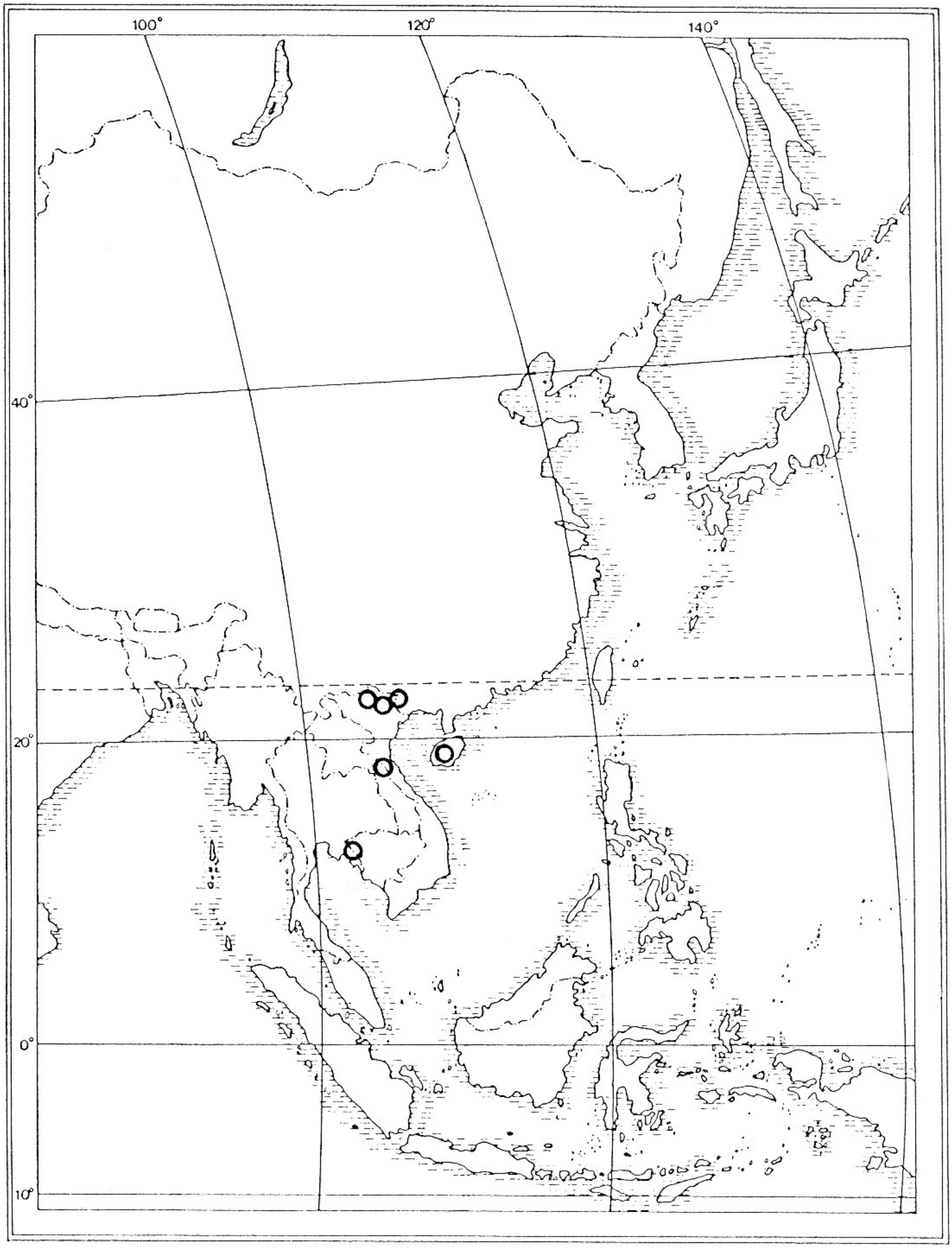

Fig. 72. Distribution of *Ardisia silvestris*.

24. **Ardisia velutina** Pitard in Lecomte, Fl. Gen. Indo-chine 3: 813. 1930. **Fig. 73**

A small shrub ca. 2-3 m high, pubescent with elongate-bicellular-capitate hairs on vegetative parts and inflorescences; stems velutinous when young, nearly glabrous when mature; hypsophylls unknown; leaves subverticillate, chartaceous, obovate to oblanceolate, 18-24 cm long, 6-9.5 cm wide, acute to acuminate at the apex, attenuate and decurrent to the base, serrulate, glabrous above, velutinous beneath, sparsely and minutely punctate, the lateral veins 17-25 pairs, plane above and conspicuously raised beneath; petioles winged, nearly glabrous above and velutinous beneath, Inflorescences umbellate-paniculate, axillary from hypsophylls(?), 9-14 cm long, velutinous; pedicels 1.2-1.4 cm long; sepals united 1/4-1/5 their length, the lobes triangular, ca. 1.2 mm long, obtuse at the apex, ciliate, minutely punctate; corolla-lobes unknown; ovary unknown. Fruit red, globose, ca. 7 mm in diameter, velutinous, minutely punctate.

Typification. For this species, Pitard cited two collections, one by Balansa, the other by Poilane, without giving the members of the collections. Two specimens on loan from the Musee Histoire Naturelle (Paris) were examined. These are *Balansa 3945* and *Poilane 7748*. Since the notes on these sheets are exactly the same as those given in the original publication, these two collections are undoubtedly the syntypes of this species. After examining these two collections, I concluded that each represents a distict species because the characters of the inflorescence, calyx, pubescence, leaf-shape, and punctation are distinctly different. I hereby select *Poilane 7748* as the lectotype of *A. velutina* since the specific epithet is referable to this collection. *Balansa 3945* is the holotype of a new species *A. balansana* Yang.

Distribution. Vietnam. (Fig. 74).

Ecology. Fruiting specimens were collected in July and August.

Note. This species is possibly allied to *A. ramondiaeformis* Pitard, but differs in having stems 2-3 m high, fruit smaller, punctate dots minute and sparse, hairs straight, and petioles winged. This species may also be related to *A. silvestris* Pitard. Although, they are difficult to separate on the basis of leaf shape, they are readily distinguished by their vestiture, inflorescence length, and sepal shape.

II. **Ardisia** subgenus **Chinensia** (Nakai) Yang, *stat. nov.*

Ardisia section *Chinensis* Nakai in Nakai & Honda, Nova Fl. Jap. 9: 49. 1943.

Type species. *Ardisia chinensis* Benth.

Description. Small shrubs with a creeping rhizome, pubescent with irregular peltate scale on young stems, petioles, undersurface of leaves, and inflorescences. Hypsophylls wanting. Leaves alternate, chartaceous or somewhat membranous, entire or undulate, the lateral veins slender, numerous, the reticulate veins obscure. Inflorescences umbellate or rarely umbellate-paniculate, axillary from leaves; calyx-lobes triangular; ovules 5-7 in 1-2 whorls.

Note. In this treatment, only two species are included under this subgenus. In fact, the characters of this subgenus are very similar to those of Mez's subgenus *Akosmos*, except for the arrangement of the whorls of ovules. In *Akosmos*, the whorls of ovules are 2 to several. In examining all species of subgenus *Akosmos* described in Mez's publication (1902), I found that at least one of them, *Ardisia rhomboidea* Wight, has the ovules arranged in a single series. This suggests that either subgenus *Akosmos* is heterogeneous or the variation of

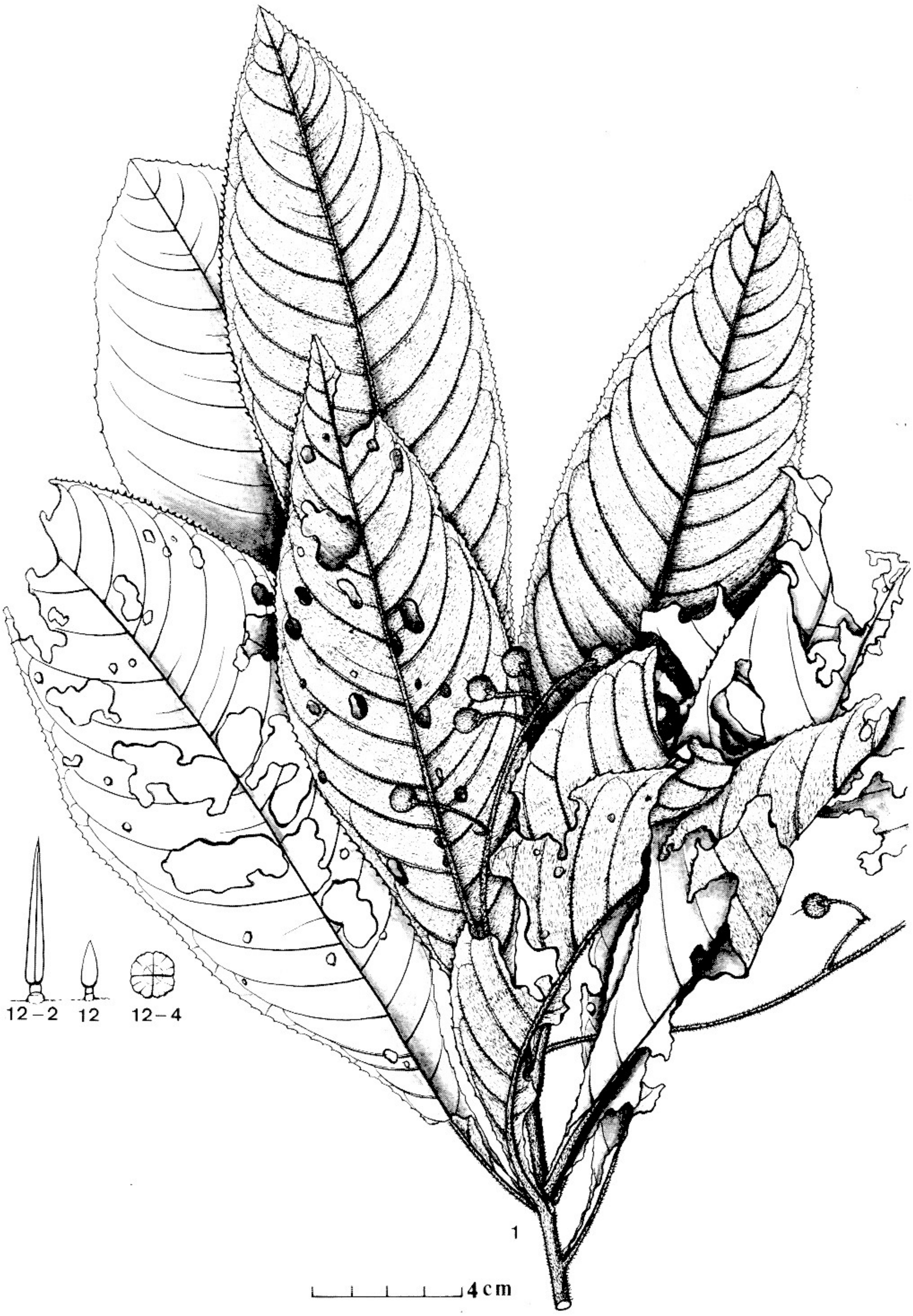

Fig. 73. *Ardisia velutina* (*Poilane 7748*). 1. Habit; 12-2. Elongate-bicellular-capitate hairs; 12-4. Round-capitate hairs.

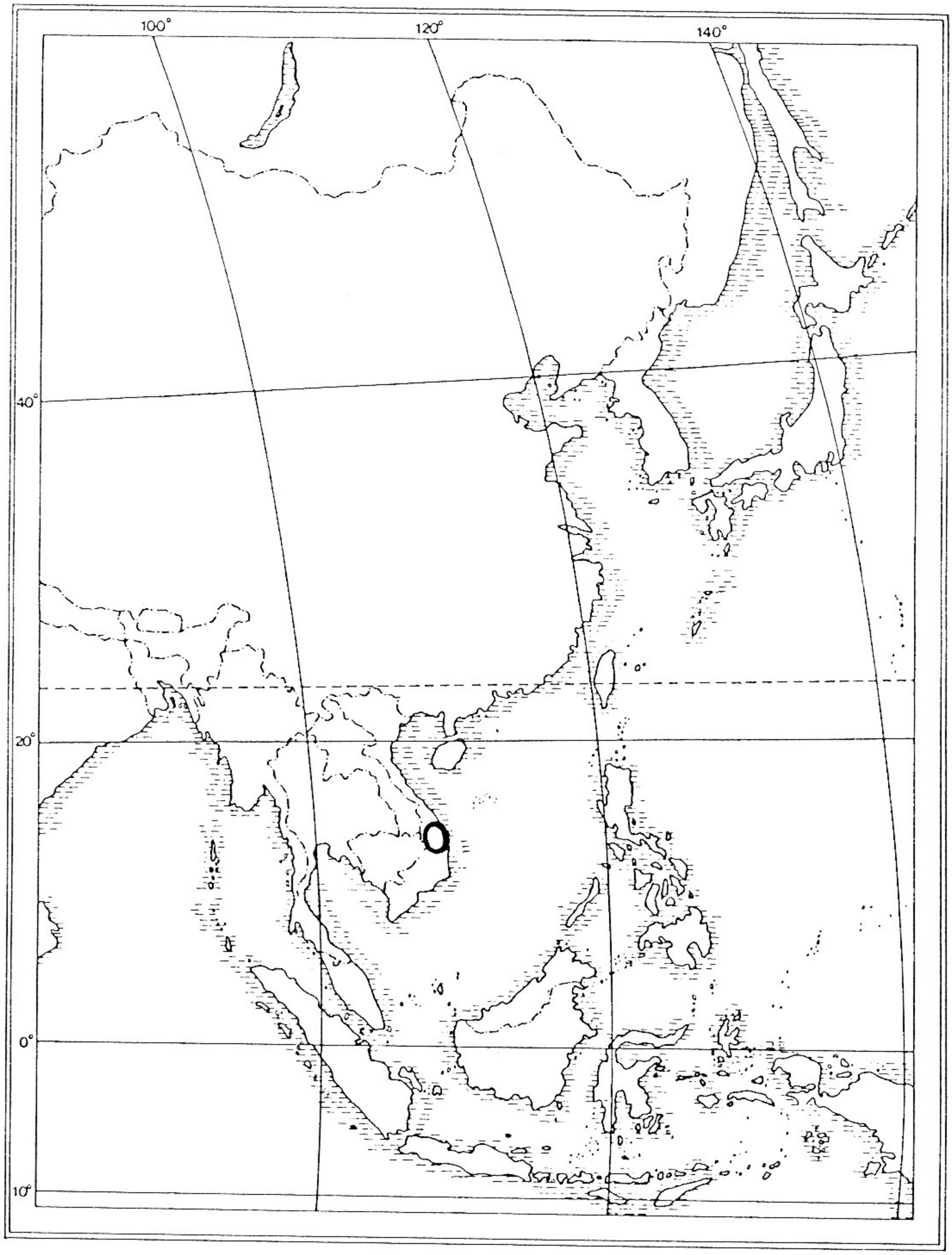

Fig. 74. Distribution of *Ardisia velutina*.

ovule arrangement in the subgenus is more flexible than recognized previously in having 1 to several whorls. Therefore, Mez's subgenus *Akosmos* seems to demand further investigation.

25. **Ardisia argenticaulis** Yang, *sp. nov.*

Ardisia triflora sensu Walker in Philipp. Journ. Sci. *Bot.* **73**: 130. fig. 26. 1940. excl. syn. & specim. *Ford 107*; non Hemsl.
Ardisia triflora sensu C. Chen in Agend. Academ. Sinic., Fl. Reipubl. Popul. Sinic. **58**: 92. pro parte, major; non Hemsl. **Fig. 75**

Suffrutex, rhizomate repente; caules erecti non ramosi, 11–43 cm alti, dense ferrugineo-squamulosi; folia alternata, membraneo-subcoriacea, obovata, 6.1–12.3 cm longa, 2.3–4.3 cm lata, apice acuminata vel obtusa, basi cuneata, supra glabra, subtus ferrugineo-squamulosa, costa supra concava subtus convexa, nervis lateralibus multis, petiolis 3–10 mm longis. Inflorescentia axillaris, subumbellata, 8–12 floribus praedita; lobi calycis basin paulum connati, lobis lineari-triangularibus, circa 1.6 mm longis, acutis; petala ovata, circa 3 mm longa, apice obtusa; stamina ovato-lanceolata; ovula circa 12 biseriatim disposita. Fructus subglobosus, epunctatus.

A small erect shrub with a creeping rhizome, pubescent with irregular peltate scales on young vegetative parts and inflorescences; stems up to 43 cm high, with brown scales at the apex, silvery-grey below; leaves alternate, membranous, obovate, 6.1–12.3 cm long, 2.3–4.3 cm wide, obtuse or acute or acuminate at the apex, cuneate at the base, entire or slightly undulate, glabrous above, the undersurface lepidote with brown scales and mixed with short hairs, lateral veins as many pairs, slender, not prominent, not uniting in a distinct marginal vein, the midrib raised beneath. Inflorescences subumbellate, axillary, arising from normal leaves, 8–12-flowered, up to 4 cm long, ferruginous-lepidote throughout, at least when young; peduncles very slender, 3 cm long; pedicels slender, ca. 1 cm long; flowers white; sepals shortly united at the base, the lobes triangular-lanceolate, acute, finely ciliate, obscurely punctate, ferruginous-lepidote at the base; corolla-lobes ovate, obtuse, glabrous, sparsely punctate; anthers lanceolate-ovate, acute, not punctate on back; ovary subovate, glabrous; ovules ca. 12 in two whorls. Fruit ovoid, 5–7 mm in diameter, not punctate, glabrous.

Typification. The holotype of *A. argenticaulis* is *W. Y. Chun 6274*, deposited in the Herbarium of Arnold Arboretum of Harvard University; this was collected at Ting-wu Shan, Kwangtung, China, in 1928. An isotype is deposited in the Herbarium of the University of California, Berkley.

Distribution. China. (Fig. 76).

Ecolog. Plants grow in dense shade of forest floor.

Note. *A. chinensis* is closely related to *A. argenticaulis* because both have similar leaf shape, inflorescences, flowers, and habit. The former differs from the latter in having brown stems, thicker calyx-lobes and a single series of ovules.

In his paper of 1940, Walker referred three collections to *A. trifiora* Hemsley. Of the three, *Ford 107* is the type specimen of *A. triflora*, so designated by Hemsley in 1889. In fact, as this type is very similar to the type of *A. chinensis*, it is treated as a synonym of *A. chinensis* (discussed in the following species). On the other hand, the other collections referred to *A. triflora* by Walker (in Philipp. Journ. Sci. Bot. **73**: 130) are obviously different from *Ford 107*, representing an

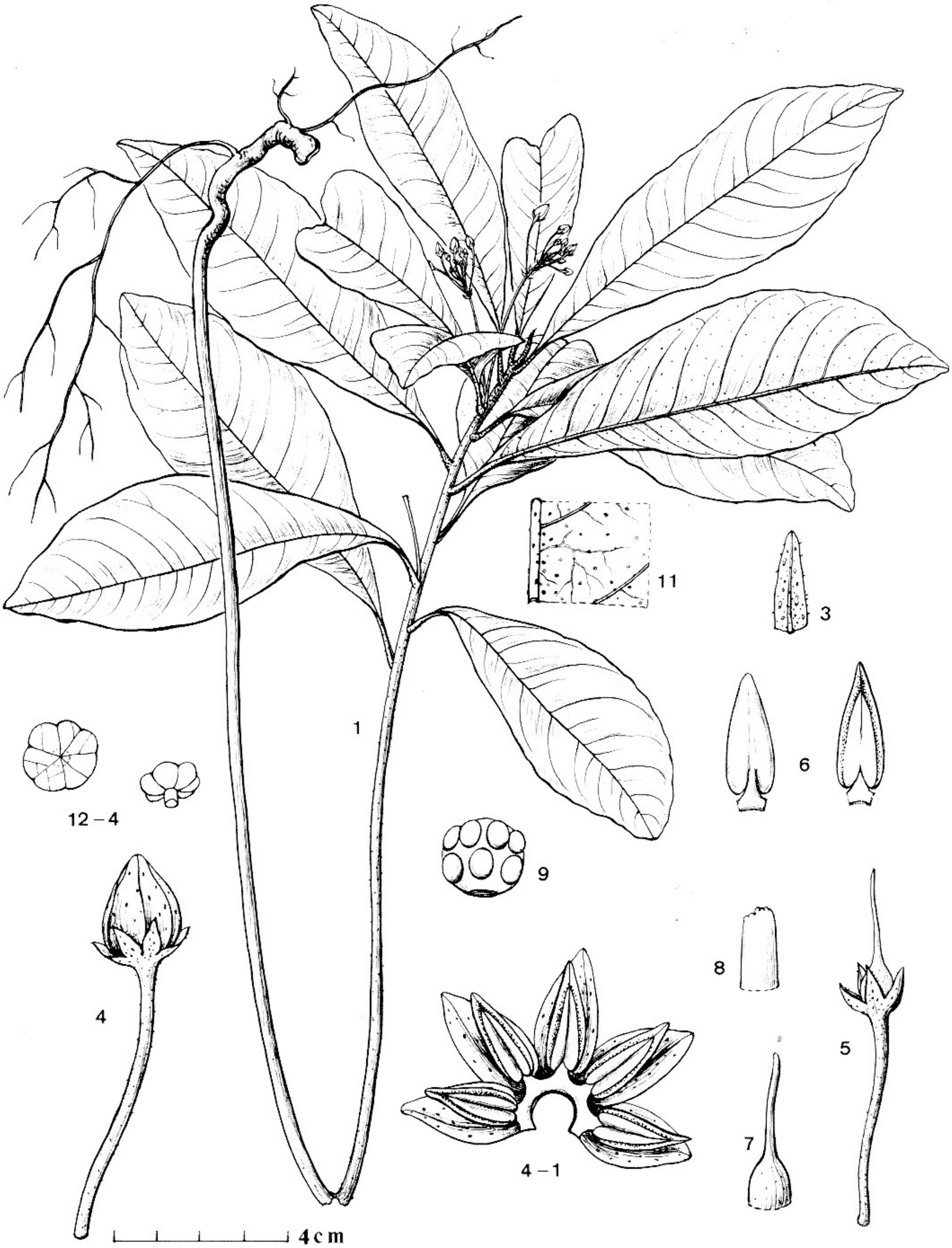

Fig. 75. *Ardisia argenticaulis* (*Chun 6274*). 1. Habit; 3. Bracteole; 4. Floral bud; 4-1. Petals and stamens; 5. Pedicel with calyx and a pistil; 6. Stamens; 7. Pistil; 8. Stigma; 9. Ovules on a placenta; 11. Magnified part of a leaf; 12-4. Round-peltate scale

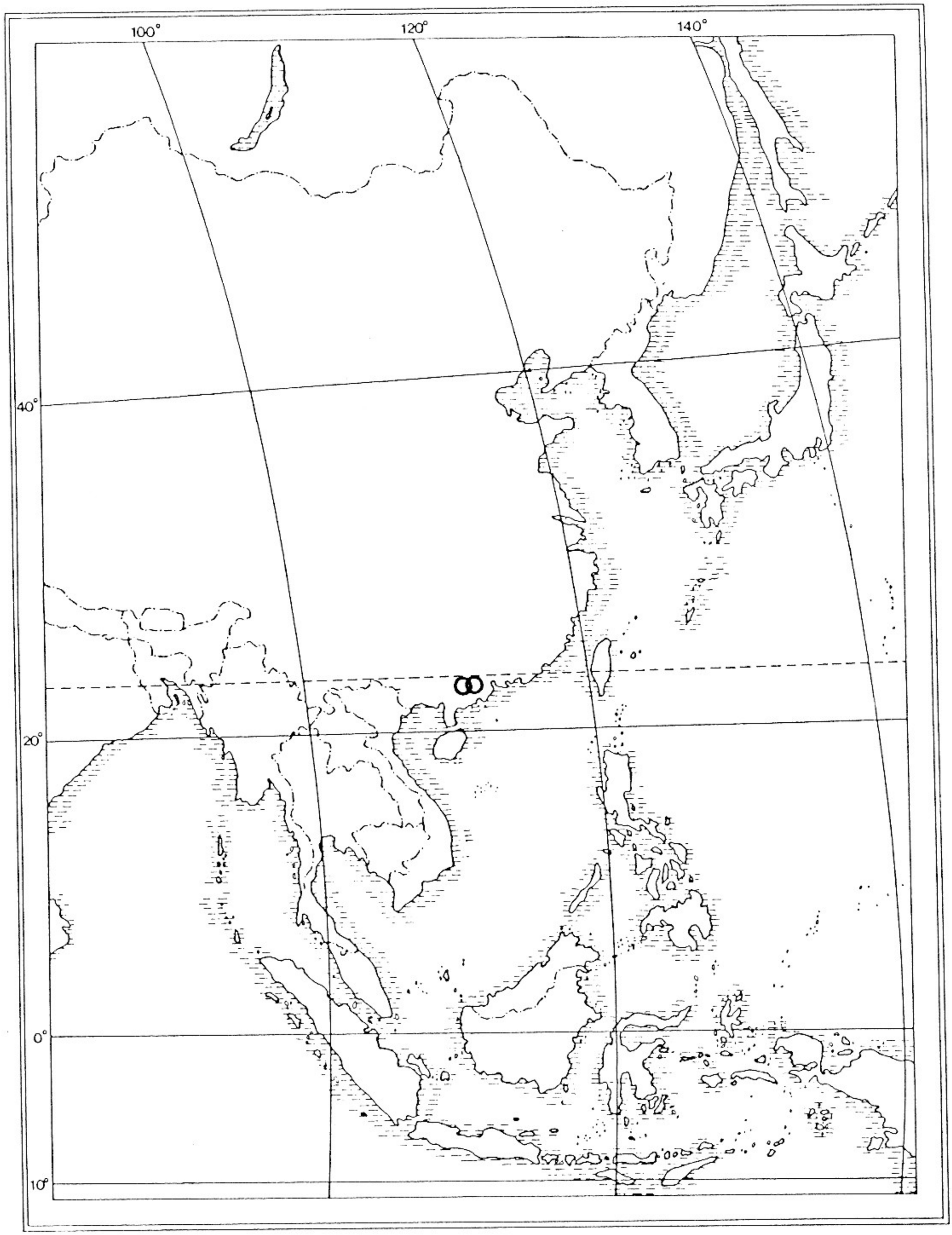

Fig. 76. Distribution of *Ardisia argenticaulis*.

undescribed species. The differences were listed by Walker as "This appearently rare species (he indicated *A. triflora*, currently = *A. argenticaulis*) is recognized by its almost entire, slightly undulate, alternate leaves, 7 cm long or longer, its greyish-green to silvery-grey stems, and its slender peduncles and pedicels." In view of this, I am describing a new species, *A. argenticaulis*, based on these 2 collections.

26. **Ardisia chinensis** Benth., Fl. Hongk. 207. 1861; Hemsl. in Journ. Linn. Soc. **26**: 63. 1889; Mez in Engler, Pflanzenr. **9** (IV. 236): 151. 1902; Kanehira, Formosa Trees, rev. ed. 559. fig. 519. 1936, excl. fig. analyt. florum; Walker in Philipp. Journ. Sci. Bot. **73**: 129. 1940, in Bot. Mag. Tokyo **67**: 206. 1954, & in Quart. Journ. Taiwan. Mus. **12**: 181. 1959; H. L. Li, woody Fl. Taiwan 713. 1963; H. Hatusima, Fl. Ryukyus 466. 1971; C. Chen in Agend. Academ. Sinic., Fl. Reipubl. Popul. Sinic. **58**: 90. pl. 11, fig. 9-10. 1979.

Ardisia triflora Hemsl. in Journ. Linn. Soc. Bot. **26**: 67; Walker in Philipp. Journ. Sci. Bot. **73**: 130. 1940. pro parte; C. Chen in Agend. Academ. Sinic., Fl. Reipubl. Popul. Sinic. **58**: 92. 1979. pro parte, major.

Ardisia japonica sensu Benth. in Hook., Journ. Bot. **4**: 301. 1852; non Blume.

Bladhia chinensis (Benth.) Nakai in Bot. Mag. Tokyo **35**: (98). 1921; Nakai in Nakai & Honda, Nov. Fl. Jap. **9**: 49. f. 7. 1943.

Bladhia chinensis (Benth.) Nakai var. *minor* Nakai in Nakai & Honda, Nov. Fl. Jap. **9**: 51. (footnote). 1943. *syn. nov.*

Tinus triflora (Hemsl.) Kuntze, Rev. Gen. Pl. **2**: 975. 1891.

Ardisia jiajiangensis Z. Y. Zhu in Bull. Bot. Res. **4**(2): 119. pl. 3. 1984. *syn. nov.*

Fig. 77

A small shrub with a creeping rhizome; stems ascending, usually branched, up to 45 cm high, minutely fuscous-lepidote when young, glabrate when mature; hypsophylls absent; leaves alternate, chartaceous, obovate or elliptic, obtuse or shortly and obtusely acuminate or acute at the apex, cuneate or acute at the base, 3-8 cm long, 1.2-2.8 cm wide, usually undulate or obtusely dentate above middle part, sometimes entire, glabrous above, lepidote beneath, the midrib subplane above, raised beneath, the lateral veins numerous, slender, slightly raised on both surfaces when dry, uniting into a marginal vein; petioles 3-8 mm long, lepidote. Inflorescences subumbellate or rarely subumbellate-paniculate, axillary from normal leaves, 3-10-flowered; peduncles 1-3 cm long, lepidote; bracteoles 1-5 mm long, linear triangular or oblanceolate, lepidote; pedicels 5-8 mm long, lepidote; sepals united 1/3-1/4 their length, the lobes triangular-ovate, ca, 1 mm long, acute or acuminate, lepidote beneath, ciliate, punctate or not; corolla-lobes united at the base, white or pink, the lobes triangular-ovate, ca. 4 mm long, 2 mm wide, acuminate or acute at the apex, not punctate; stamens ca. 2.5 mm long, not punctate; filaments ca. 0.5 mm long, united at the base; anthers triangular-ovate, acute or acuminate at the apex, sagittate at the base; ovary subglobose, glabrous; ovules 5-6 in a whorl. Fruit globose, ca. 5 mm in diameter, black when mature, not punctate.

Typification. The type collection (Kew Herbarium) is based on a specimen made by John G. Champion from a ravine of Mt. Victoria, Hongkong.

Ecology. Plants grow in dense forests or along streams or in moist places at 300 to 800 meters, flowering in April through June and fruiting in October through December.

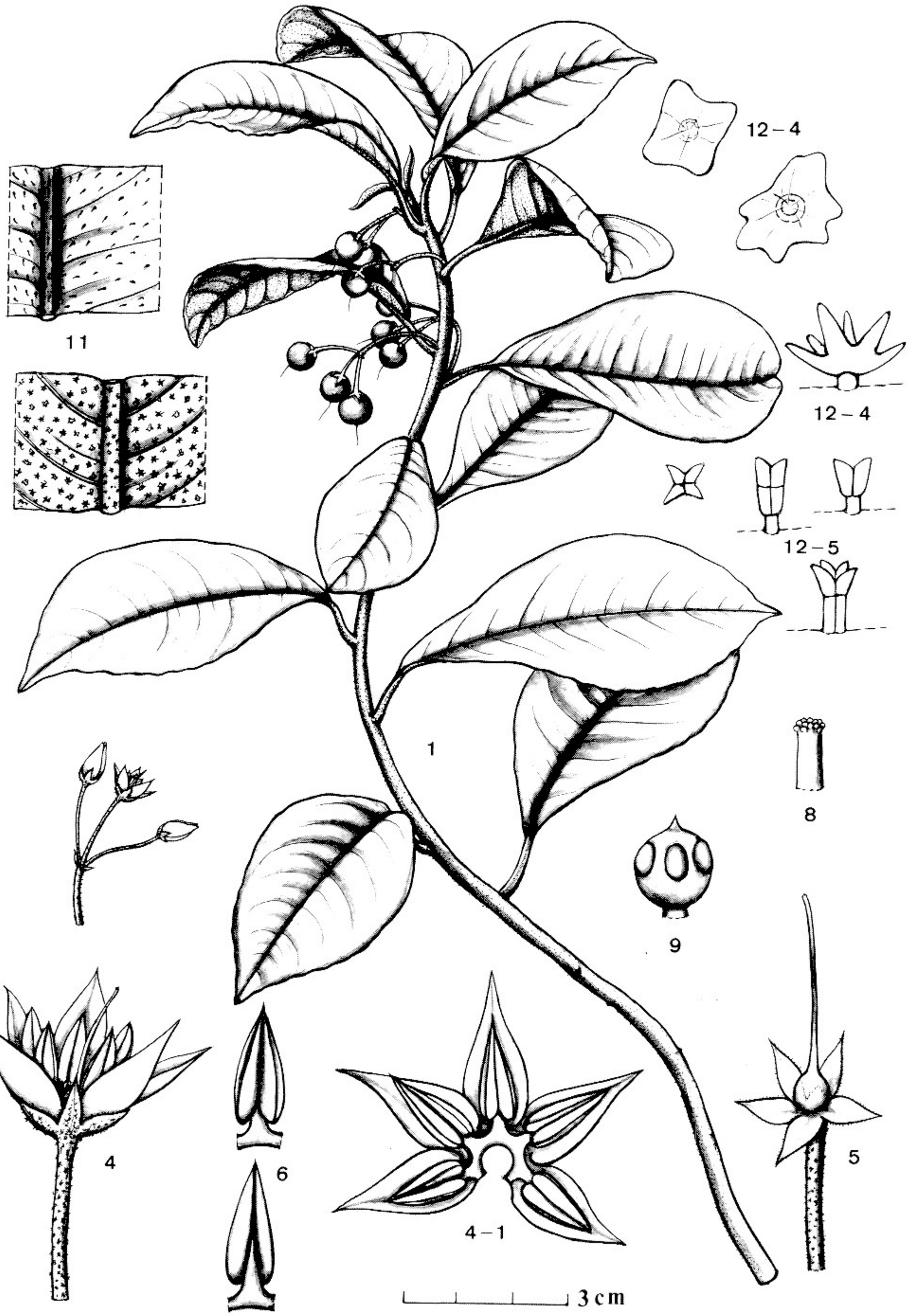

Fig. 77. *Ardisia chinensis* (*Lu s. n.* May, 1985). 1. Habit; 4. Flower; 4-1. Petals and stamens; 5. Pedicel with calyx and a pistil; 6. Stamens; 11. Magnified part of a leaf; 12-4. Irregular-peltate scales; 12-5. Biseriate hairs.

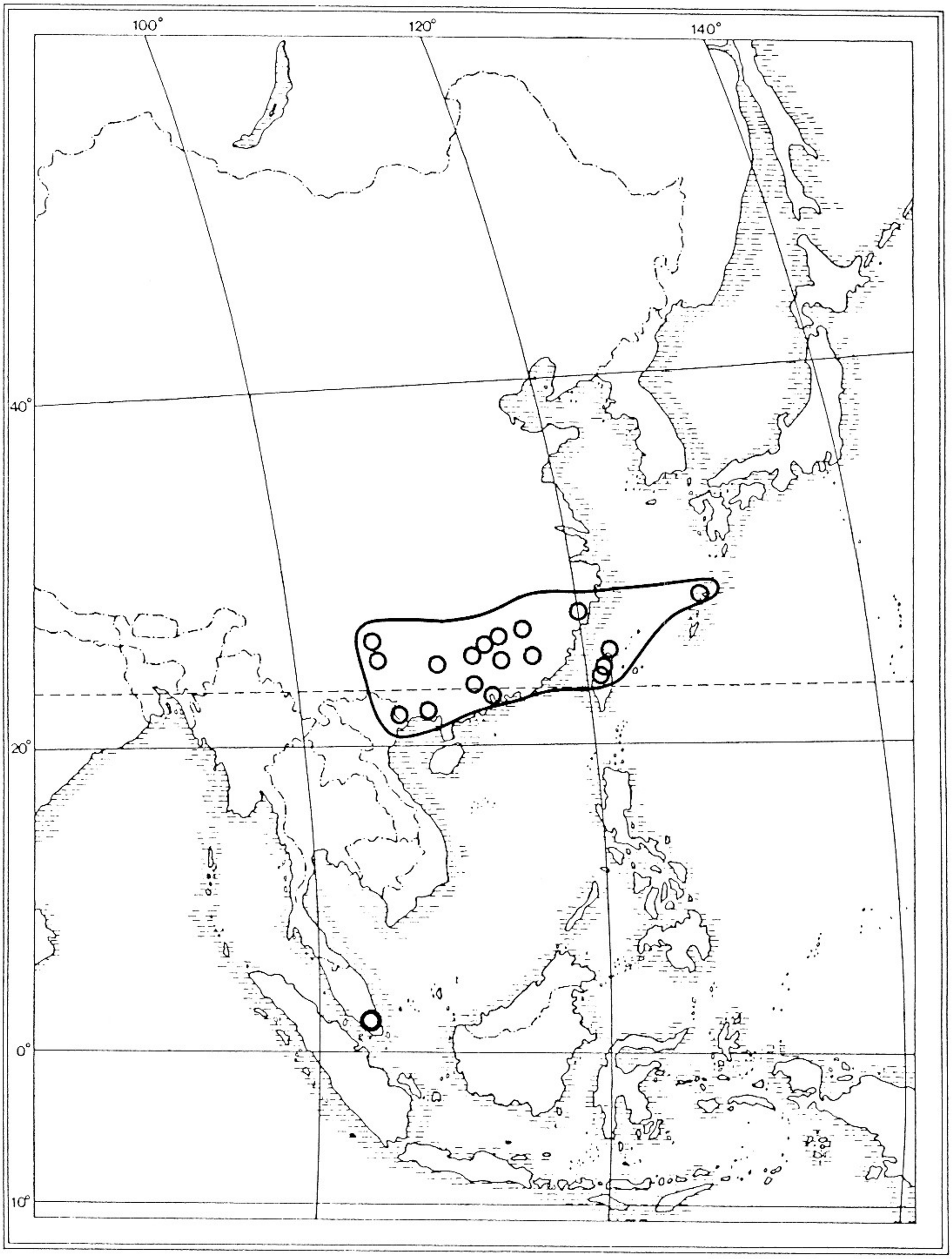

Fig. 78. Distribution of *Ardisia chinensis*.

Distribution. Malay Peninsula, Vietnam, China, and the Ryukyus. (Fig. 78).

Additional specimens examined. **MALAYSIA**. Johor: S. Telrau, *Ridley 13009* (BM). **VIETNAM**. Tai-wong-mo Shan, *W. T. Tsang 27227* (A, E), *28986* (A, E), et *29819* (A, E, US). **CHINA**. Chekiang: Ping-yung, *R. C. Ching 2003* (A, UC, US); Yuen-ping, *H. H. Chung 2981* (A, UC). Fukien: Gang-kew, *J. L. Gressitt 1702* (BM, E, MO, UC). Kiangsi: Kiennan, *S. K. Lau 4070* (A, BM); Lungnan, *S. K. Lau 4824* (A, BM); Shuei-Chuan, *W. H. Wan et al. 12068* (KUN); Yung-hsien, *A. A. Steward et H. C. Chao 934* (A, NY). Kwangtung: Fang-cheng, *W. T. Tsang 26577* (A, E, K, US); Fong-shan, *P. S. Tam 58095* (KUN, photo); Lok-chong, *C. L. Tso 20820* (NY); Lung-men, *C. F. Wei 121937* (KUN, photo); Lung-tau Shan, *To, Tsang, et Tsang s. n.* in 1924 (A, BM, MO, UC); Nan-kwun Shan, *W. T. Tsang 25289* (A, E); Shih-wan-ta Shan, *W. T. Tsang 22062* (A, US) *et 23864* (A, MO, NY); Sin-fung, *Y. W. Taam 274* (A, L); Ta-yang, *F. A. Maclure s. n.* in 1921 (NA); Ting-wu Shan, *Ting et Shih 767* (L); Wang-tong Shan, *W. T. Tsang et K. C. Wong s. n.* in 1926 (NA, UC); Wung-yuen to Ying-tak, *S. K. Lau 971* (A, NY); Yao Shan, *S. S. Sin 9118* (NY), *C. Wang 39389* (A); no further locality, *C. Ford 107* (K, type of *A. triflora* Hemsley). Taiwan: Taipei, *Lu 16400* (TAIF); Ilan, *Kanehira et Sasaki s. n.* in 1918 (TAIF); Keelung, *C. Ford 51* (BM, K); Nantou, *M. T. Kao 4021* (NA, TAI, UC); Urai, *E. Matuda 222* (UC), *B. Hayata s. n.* in 1916 (TAI, holotype, US, isotype of *Bladhia chinensis* (Benth) Nakai var. *minor* Nakai). **THE RYUKYUS**. Isl. Tokunoshima (Mt. Amagidake), *H. Hatusima 19151* (L).

Note. In spite of the surprising variation of some morphological characters such as leaf size, leaf margin, leaf texture, peduncle length, and floral number per inflorescence, this species is easily recognized by a number of characters which are more stable than the above: the marginal vein formed by the union of lateral veins, the ovules arranged in a single whorl, the calyx-lobes triangular, and leaves alternate.

Since *Ardisia triflora* Hemsl. was mentioned as a species closely allied to *Ardisia chinensis* Benth., I examined their types at the Kew Herbarium. Their resemblance is so striking that I cannot segregate them as distinct taxa. I concur with Mez in whose treatment of 1902 they are regarded as conspecific.

INSUFFICIENTLY KNOWN SPECIES

1. **Ardisia cordulata** Fletcher var. **appresso-hirsuta** Fletcher in Kew Bull. **1937**: 28. 1937.

According to Fletcher (1937), var. *appresso-hirsuta* can be readily distinguished from var. *typica* as it has appressed hairs along the veins of the leaves and has the peduncle of the inflorescence reduced in length. After comparing those two taxa, I found that the leaves with 13 or more pairs of lateral veins and longer petioles as well as the presence of appressed hairs represent additional reasons for distinguishing it from var. *typica*.

In reducing *A. cordulata* to synonymy under *A. metallica*, I compared the variety with *A. metallica*. The characters of var. *appresso-hirsuta*, mentioned above, readily separate it from *A. metallica*, strongly suggesting that it is worthy of specific rank.

Variety *appresso-hirsuta* is closely related to *A. odontophylla*; both have long petioles as well as 13 or more pairs of lateral veins, but var. *appresso-hirsuta* has appressed hairs along the veins. Because no floral material is available, its status,

whether at the specific or varietal level, is a problem that future collections may solve.

2. **Ardisia velutina** sensu C. Y. Wu & C. Chen, Fl. Yunnanica 1: 355. pl. 84, 1-3. 1977; C. Chen in Agend. Academ. Sinic., Fl. Reipubl. Sinic. 58: 87. pl. 14, 1-3. 1979; non Pitard.

No collections of this taxon were available for examination in this work. It is known only from Wu and Chen's description and illustration in their publication (1977). This taxon undoubtedly represents a distinct species and probably an unnamed new species when it is compared with the type of *A. velutina* Pitard. Although its whorled and serrulate leaves suggest that it is a member of Mez's subgenus *Bladhia*, the flowering branch with 2 or 3 terminal leaves precludes its placement in this subgenus. The most likely location of the taxon seems to be in subgenus *Crispardisia*. The fact that Chen described the ovules as being disposed in two series and marginal glands being absent in the leaf sinuses, dissuaded me from placing it therein.

EXCLUDED SPECIES

1. **Ardisia primulifolia** Gardn. & Champ. in Jour. Bot. Kew Misc. 1: 324. 1849; Mez in Engl., Pflanzenr. 9(IV. 236): 153. fig. 23, f-1. 1902; Pitard in Lecomte, Fl. Gen. Indo-Chine 3: 853. 1930; Walker in Philipp. Journ. Sci. Bot. 73: 98. 1940; Anonymous, Fl. Hainanica 3: 173. 1974; C. Y. Wu & C. Chen, Fl. Yunnanica 1: 354. fig. 83. 1977; C. Chen in Agend. Academ. Sinic., Fl. Reipubl. Popul. Sinic. 58: 86. 1979.

2. **Ardisia mamillata** Hance in Journ. Bot. 22: 290. 1884; Mez in Engl., Pflanzenr. 9(IV. 236): 153. 1902; Pitard in Lecomte, Fl. Gen. Indo-Chine 3: 854. 1930; Walker in Philipp. Journ. Sci. Bot. 73: 97. 1940; Anonymous, Fl. Hainanica 3: 173. 1974; C. Y. Wu & C. Chen, Fl. Yunnanica 1: 354. fig. 83. 1977; C. Chen in Agend. Academ. Sinic., Fl. Reipubl. Popul. Sinic. 58: 86. 1979.

3. **Ardisia verbascifolia** Mez in Engl., Pflanzenr. 9: 153. 1902; Pitard in Lecomte, Fl. Gen. Indo-Chine 3: 855. 1930.

Pitard (1930), noting the crenate leaves with marginal glands in the sinuses, which mainly characterize Mez's subgenus *Crispardisia*, placed *A. primulifolia*, *A. mamillata*, and *A. verbascifolia* in the section *Crispardisia* (=Mez's subgenus *Crispardisia*). Later, Walker (1940) and C. Chen (1979) argeed with Pitard's arrangement in their treatments of the Eastern Asian species and Chinese species respectively (which do not include *A. verbascifolia*), placing the first two species in this section. After carefully examining the type collections of these three species (*Wright n. 126* at K for *A. primulifolia*, *Ford n. 59* and *n. 796* at Herbarium Kew for *A. mamillata*, *Balansa n. 3937* at K for *A. verbascifolia*), I am in agreement with Pitard and am excluding the species from this revisionary work.

4. **Ardisia undulato-dentata** Fletcher in Kew Bull. 1937: 39. 1937.

In the original description, this species was treated by Fletcher (1937) as being allied to *Ardisia japonica* (Hornst.) Bl. because he regarded the undulate-dentate leaves as similar to those of the latter. In fact, after examining the type specimen (*Put 1631* at K and BM), I prefer to place it in Mez's subgenus *Akosmos*.

This suggested move is based on the leaves having peltate scales on the undersurface, the inflorescences with short peduncles at the apex of lateral branches, and the calyx-lobes being triangular and having scales on the undersurface.

5. **Ardisia impressa** Fletcher in Kew Bull. **1937**: 31. 1937.

In view of the leaves having the veins on the adaxial surface canaliculate and the margin undulate-dentate, Fletcher (1937) assumed that the species is related to the species *A. undulato-dentata* Fletcher. However, the short-peduncled inflorescences at the apex of lateral branches, irregular peltate scales, and triangular calyx-lobes of the type collection (*Put 216*, Herbarium Kew) strongly suggest that *A. impressa* belongs to subgenus *Akosmos*.

6. **Ardisia violacea** (Suzuki) W.Z. Fang & K. Yao in Acta Phytotax. Sinic. **17**(4): 99. 1979.

Bladhia violacea Suzuki in Trans. Nat. Hist. Soc. Formosa **25**: 41. 1935.
Ardisia brevicaulis Diels var. *violacea* (Suzuki) Walker in Bot. Mag. Tokyo **67**: 208. 1954.

Originally, Walker (1940) placed this taxon in species incertae as he had no collections at hand for study. He suggested that it be included in the subgenus *Bladhia*. In 1943, Nakai first treated it as a member of the subgenus *Crispardisia*. In 1954, Walker accepted Nakai's treatment but ranked it as a variety of *Ardisia brevicaulis* Diels. By emphasizing its herbaceous habit, slender inflorescence with a few flowers as well as few or no leaves on the upper part of a flowering branch, Fang and Yao (1979) followed Walker's suggestion, placing it in the subgenus *bladhia*. Actually, it was an unfortunate decision as they disregarded the inconspicuous marginal glands in the leaf sinuses. I am in agreement with Nakai's arrangement and am excluding the taxon from this work.

7. **Bladhia japonica** sensu Blanco, Fl. Filip. 126. 1837; non Hornstedt.

This species known in the Philippines is distinctly different from *Bladhia japonica* Hornstedt, and certainly not a member of subgenus *Bladhia* by having inflorescences terminal at the lateral branches, a key character to distiguish the subgenera in the genus *Ardisia*.

ACKNOWLEDGEMENT

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We wish to thank Dr. Benjamin C. Stone who read the manuscript and gave valuable suggestion and let us read a copy of his manuscripts of Myrsinaceae for the book *Tree Flora of Malaya*, Miss Hongya Gu who photographed many specimens of *Ardisia* when she visited herberia in Mainland China, to Mr. Sheng-

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摘　　要

本文依形態特徵檢討梅滋（Mez）在西元 1902 年處理全世界紫金牛科時，於紫金牛屬中所成立鋸齒亞屬（*Bladhia*）之植物。根據研究結果得知，該亞屬中的種類並非自然的一羣，其中兩種應另成爲華紫金牛亞屬（Sect. Chinensis）之必要。鋸齒亞屬的特徵應修正爲：灌木或亞灌木；花序僅由苞葉腋或皆由苞葉腋和葉腋生出；胚珠 4～15 粒，成一輪至三輪排列（絕大多數成一輪），中央獨立胎座；葉輪生或近于輪生（極少數成互生），有鋸齒或細鋸齒或流蘇狀鋸齒；莖上有苞葉；植物體有單列狀毛，頭狀毛，或二長細胞頭狀毛。由花序的位置推測，鋸齒亞屬可能和高木亞屬（Subg. *Tinus*）有相近的親緣性，但此觀點仍待商榷。

具有兩種的華紫金牛亞屬的特徵爲：花序限生於葉腋；5～8 個胚珠成一至二輪排列；葉互生，全緣或有波狀緣或有粗而不銳的鋸齒；莖上無苞葉，幼嫩部份和葉背有不規則形狀的盾狀鱗片。以花序、萼片、胚珠排列、和鱗片等特徵推論，此新成立的亞屬和腋序亞屬（Subg. *Akosmos*）有較密切的親緣關係。

就地理分佈而言，鋸齒亞屬從印度東北方的阿薩姆向東至馬來半島、爪哇、婆羅洲、中南半島、菲律賓、中國大陸東南各省、臺灣、琉球、韓國、日本。而華紫金牛亞屬在馬來半島、越南有零星分佈外，主要在中國大陸的東南各省、臺灣和琉球。